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# Educational Program Attributes and Faculty Teaching Behaviors as Predictors of National Physical Therapy Examination Success

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Educational Program Attributes and Faculty Teaching Behaviors as Predictors of  
National Physical Therapy Examination Success

By

Natonya Q. Early

A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy

Nova Southeastern University  
College of Health Care Sciences  
Physical Therapy Department

2017

Signature (Approval) Page

We hereby certify that this dissertation, submitted by Natonya Q. Early, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirement for the degree of Doctor of Philosophy.

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2017

## Abstract

**Purpose:** To determine the differences between PT program NPTE 3-year ultimate pass rates (3YUPR) based on program length and faculty scholarship. To explore relationships between 3YUPR and quality faculty behaviors.

**Subjects:** A total of 112 CAPTE accredited PT educational programs in the United States and Puerto Rico during 2013. **Method:** A quantitative design method was used to retrospectively test differences between program and faculty traits and student NPTE 3YUPR using data from the Commission on Accreditation in Physical Therapy Education (CAPTE), PT Annual Accreditation Reports (AAR) and Federation of State Boards of Physical Therapy (FSBPT) score reports. A self-generated faculty survey was used to prospectively obtain faculty behavior data in programs with high versus low NPTE outcomes.

**Results:** The final survey had an acceptable Cronbach alpha score of 0.701. All survey items yielded a high percentage of correct classification above 75%. Eighteen faculty behaviors were consistent with high rated NPTE PT programs (p-values between  $>0.001$  to  $0.034$   $\alpha$  level  $0.05$ ). Use of Independent t-tests found a significant difference between means of scholarly activity performed by faculty at high ( $22.54 \pm 11.63$ ) and low ( $14.77 \pm 8.47$ ) ranked schools,  $t(70) = 2.99$ ,  $p = 0.004$ . No statistically significant difference was found between PT program lengths in higher ranked programs ( $121.52 \pm 12.16$ ) compared to low ranked programs ( $123.96 \pm 18.80$ ),  $t(37) = -0.595$ ,  $p = 0.555$ . **Conclusions:** This study found the sum of scholarly activity performed by faculty differs between high and low 3YUPR. No differences found in total program lengths when

assessing by program 3YUPR. A survey tool was created that tested faculty behaviors consistent with programs that score high on the NPTE.

**Recommendations:** Testing should be performed on a greater number of constructs representing faculty behaviors of quality programs for survey development. Correlations should be performed with faculty data from the same year and NPTE first time pass rates for an assessment of predictive relationships. Also, a repeated longitudinal design study is recommended for PT educational programs with high versus low NPTE scores using the self-generated survey to see how faculty behaviors impact student first time pass rates.

## Table of Contents

Abstract .....	ii
List of Tables .....	viii
List of Figures .....	ix
Chapter 1- Introduction.....	1
Problem Statement.....	3
Goals of Study .....	3
Research Questions .....	3
Definitions of Terms.....	4
Summary .....	7
Chapter 2- Review of Literature.....	8
Introduction.....	8
Theoretical Framework.....	11
A Historical Perspective on PT Education Standards and Professional Training.....	12
Current History: Today's Challenges in PT.....	16
Student Competence Defined.....	17
Characteristics Used to Determine Program Quality and Student Outcomes .....	19
Faculty Behaviors .....	21
Behaviors of Effective Classroom Teachers/Faculty.....	21
Faculty Qualification In Grade School vs. Higher Education.....	27
The Importance of Scholarship When Assessing Teacher Effectiveness .....	30
The Faculty Dilemma: Creating Synergy Between Teaching and Scholarship.....	33
Public Health.....	42
Scholarship In PT Education & Nursing Disciplines.....	43
Physical Therapy .....	43

Nursing .....	46
Physical Therapy Program Characteristics.....	46
Program Length In PT Education and In Other Disciplines.....	46
Program Length In Nursing Education .....	47
Program Length In Medical Education .....	48
Program Length In Athletic Training Education vs Certification Examination Pass Rates.....	50
Length of Clinical Education Programs and Types of Clinical Settings.....	51
Physical Therapy .....	51
Dentistry.....	52
Translating Contemporary Practice Guideline to Clinical Practice...	53
Annual Accreditation Report (AAR) .....	58
The National Physical Therapy Examination (NPTE) .....	58
Reliability .....	59
Validity .....	60
Summary .....	60
Chapter 3- Methodology .....	63
Introduction.....	63
Subjects.....	64
Sample Selection/Inclusion Criteria .....	64
Exclusion Criteria.....	65
Procedures .....	65
Stage 1- Development, Validation and Internal consistency of the Self- Generated Faculty Behaviors Survey .....	65
Stage 2- Examining Faculty Behaviors of PT Programs With High Versus Low NPTE 3YUPR .....	72
Stage 3- Exploring The Differences of Faculty Scholarly Activity and PT Program Length Between Programs With High and Low 3YUPR.....	73

Chapter 4- Results.....	76
Introduction.....	76
Stage 1 Survey Factor Analysis.....	76
Round 1 Survey Response Descriptive Statistics .....	78
Round 2 Survey Response Descriptive Statistics .....	80
Internal Consistency of the Self-generated Faculty Survey: Faculty Behaviors In PT Educational Programs .....	81
Stage 2 Research Question Findings .....	81
Faculty Behaviors In High vs. Low NPTE Pass Rates .....	81
Descriptive Statistics.....	82
Skewness .....	82
Cross Tabulation/Chi-Square Findings.....	83
Stage 3 Research Question Findings .....	85
NPTE 3YUPR Vs. Program Scholarly Activity and Program Length.....	85
Summary .....	88
Chapter 5- Conclusion.....	106
Introduction.....	106
Limitations .....	106
Delimitations .....	108
Conclusions .....	110
Recommendations for Further Research.....	114
Appendices.....	117
Appendix 1- Descriptors/Constructs Defining Faculty Scholarship, Teacher Effectiveness and Service .....	117
Appendix 2- Survey Development: First Pilot Survey .....	119
Appendix 3- Second Phase Survey Instrument Final Faculty 22 Item Questionnaire .....	122
Appendix 4- FSBPT Request Letter For Student 2013 NPTE Pass Rates .....	124



Appendix 5- Federal State Board of Physical Therapy Data Collection Form .....	128
Appendix 6- FSBPT Instructions For Data Collection Form.....	126
Appendix 7- CAPTE Request Letter For AAR Data.....	127
Appendix 8- CAPTE Annual Accreditation Report Data Collection Form	129
Appendix 9- CAPTE Instructions for Data Collection Form.....	130
Appendix 10- Round 1 Survey: Low Classification Items.....	132
References .....	133

## LIST OF TABLES

Table 1. Faculty Teaching Behaviors In PT Programs With High Versus Low 3YUPR.....	84
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## LIST OF FIGURES

Figure 1. Faculty Perceptions of Scholarship, Teaching, and Service.....	77
Figure 2. Total Scholarly Activity and PT Program NPTE 3YUPR Outcomes ....	86
Figure 3. Total Program Length and PT Program NPTE 3YUPR Outcomes.....	88

# Educational Program Attributes and Faculty Teaching Behaviors as Predictors of National Physical Therapy Examination Success

## **CHAPTER 1: INTRODUCTION**

Quality in higher education, according to Bennet, should be assessed using the “value added” method, which defines what has improved in a student’s knowledge as a consequence of their education at a college or university.<sup>1</sup> In each physical therapy (PT) educational program, added value is determined by student and program outcome measures. Written and standardized test results, which are collected throughout the curriculum, measure a student’s knowledge and retention of the materials taught; also known as formative assessments.<sup>1</sup> However, the ultimate PT education outcome measure (summative assessment) is a student’s score on the National Physical Therapy Examination (NPTE).

The NPTE is a 250 multiple choice question national licensure examination that is developed and administered by the Federation of State Boards of Physical Therapy (FSBPT) to assess the basic entry-level competence of candidates who have graduated from accredited PT programs.<sup>2</sup> The Commission on Accreditation in Physical Therapy Education (CAPTE) uses the three year average student pass rate on the NPTE as a quality indicator to determine program quality.<sup>3</sup> A scaled NPTE passing score of 600/800 is required for a candidate to obtain a license to practice PT in the US.<sup>2,3</sup>

Previous studies have been conducted to ascertain if a relationship exists between a student's academic performance and the NPTE scores.<sup>4-6</sup> The premise of these studies being that if a student performs well during the curriculum, they will in turn pass the NPTE.<sup>4</sup> Other researchers have chosen to focus on program and faculty characteristics and their possible relationships with NPTE success.<sup>1,7-11</sup> The results of these studies vary and are thus inconclusive and inconsistent because of limitations in sample size and/or methodology. The available literature also offers proposed models<sup>12-13</sup>; suggestions based on personal opinions<sup>14-17</sup>; and provide only a few references addressing the effects on NPTE success<sup>18-19</sup>; or have limited results that do not substantiate any relationships between program characteristics and student outcomes on the NPTE.

CAPTE has published a document entitled Rules of Practice and Procedures in which it states that accreditation serves as an indication of quality by establishing the standards against which all physical therapy education programs can be measured.<sup>20</sup> Also, the Southern Association of Colleges and Schools (SACS) has produced a document entitled Accreditation Standards For Quality Schools which provides quality indicators for teaching and learning.<sup>21</sup> However, both documents mention standards for faculty scholarly activity, overall program length and faculty effectiveness that are vague and are not specific or sufficiently detailed to be measurable for use as points of reference.

The extent to which the PT faculty, curriculum, and student outcomes are aligned serves as a proxy measure of program quality that remains unclear. Therefore, there is an ongoing need for further research on these educational program variables that are associated with quality preparation, since it is the intended purpose of all PT programs that students obtain commensurate academic preparation to pass the NPTE on their first attempt.

This study is significant to the PT profession because it isolated specific program and faculty traits/characteristics and explored their possible relationships with student outcomes on the NPTE. It also involved the development of a faculty survey tool to measure and distinguish between the faculty traits that are consistent with PT programs with high NPTE averages. The results of this study can be used in strategic faculty recruitment, and to enhance student-learning experiences through the use of optimal pedagogical strategies and to provide evidence of the need for potential changes in program structure.

## **PROBLEM STATEMENT**

The quality indicators for PT programs regarding faculty scholarly activity, overall program length, and faculty effectiveness in physical therapist educational programs and their effects on NPTE results remains ambiguous.

## **RESEARCH QUESTIONS**

1. What is the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their

classroom based upon their associated school rank (High vs. Low) per self-generated survey)?

2. What are the differences that exist between the total sum of PT-related scholarly activity (per Annual Accreditation Report (AAR) data) performed by PT educational program faculty with high vs. low passing NPTE rates between 2011-2013?
3. Does the total PT program length (in weeks) of the professional component (didactic and clinical) per AAR data differ when comparing programs with high vs. low passing rates on the NPTE?

### **DEFINITION OF TERMS**

**Annual Accreditation Report (AAR)** – Mandatory descriptive reports submitted annually to CAPTE by physical therapist education programs.

**Contemporary Practice** – Delivery of PT services as documented in the current literature, including the Guide to PT Practice, A Normative Model of PT Professional Education, the Standards of Practice, and the code of ethics.<sup>12</sup>

**Educational Program Quality and Effectiveness** –For the purpose of this study, program quality and effectiveness is defined as program graduate competence as measured by NPTE outcomes.

**Faculty Teaching-** Leaders in student instruction and pedagogical knowledge who participate in professional development, and self-analysis of the impact their teaching has on student learning.

**Faculty Scholarship-** Used interchangeably with scholarly productivity and scholarly activity. This is broadly defined as pertaining to faculty research that transforms and integrates knowledge with teaching to facilitate learning. This will be measured by the cumulative number of published or accepted abstracts, peer-reviewed articles, books or book chapters, and presentations of all core faculty of a given PT program during a 1 year time period (2013).

**Faculty Service-** Faculty provision, thru consulting and service-learning, of their professional knowledge in order to impact schools, colleges, professional organizations and community agencies.

**Low vs. High Achieving Programs-** For the purpose of this study high and low score percentages are based on pass rate averages from 2011-2013 and are defined as follows:

- a. NPTE high scores -100.00
- b. NPTE low scores - 95.00 and below

**National Physical Therapy Examination (NPTE) 3-Year Ultimate Pass Rates-**

Three-year average of the ultimate pass rate for a graduation class for CAPTE-accredited programs. The percentage of NPTE scores for students in a graduation class that took the NPTE and passed, no matter how many attempts it took.<sup>22</sup>



**National Physical Therapy Examination (NPTE) 1<sup>st</sup> Time Pass Rate – PT**

program graduates achieving a first time NPTE minimum passing scaled score of 600/800 as reported by the FSBPT.

**Physical Therapy Normative Model** - A consensus-based model that reflects the contemporary entry-level performance expectations for students who graduate from physical therapist professional education programs.

**Physical Therapy Program Length** – The total number of combined weeks that students participate in didactic and clinical education.

**Program Outcome Measures** – In this study, outcome measures pertain to National Physical Therapy Examination (NPTE) 3YUPR for PT students.

**Scholarly Productivity** - Scholarly activity will be measured by the cumulative number of published or accepted abstracts, peer-reviewed articles, books or book chapters, and presentations of all core faculty of a given PT program during a 1 year time period (2013).

**Teacher Effectiveness** – The degree in which teachers successfully satisfy subject objectives which foster students in achieving success on the NPTE.

**Well Prepared Clinical Faculty** – Board certified clinical specialists by the APTA and/or hold PT doctoral degrees.<sup>20</sup>

## **SUMMARY**

In summary, the goal of the NPTE is to protect the public, and as such, students who pass the NPTE and are licensed are deemed safe to practice.<sup>23</sup> Licensure is therefore a cornerstone of practice in the U.S. and the gold standard for success to which all PT educational programs strive. Therefore, by pinpointing specific differing program characteristics and faculty behaviors that can accurately predict or provide a link to NPTE success, common strategies may be developed to direct program and curricular changes that advantageously prepare students for licensure. However, there is very limited literature to determine whether or not a relationship exists between faculty behaviors or if program characteristics differ or provide a link to the success of graduates on the NPTE. Therefore, this study sought to be the first to conclusively identify a predictive relationship and differences between the variables of interest and a program's NPTE outcomes.

The results of this study may be used by PT programs to identify specific faculty or program variables that accurately predict and/or influence a student's success on the NPTE. Furthermore, this may help to guide PT programs in making pertinent changes that assist in the preparation of students for passing the NPTE on the first attempt. Also, higher success rates increase PT program reputation for the quality of the preparation of skilled student physical therapists. Lastly, findings from this study may allow CAPTE to more effectively determine program quality.

## **CHAPTER 2: REVIEW OF LITERATURE**

### **INTRODUCTION**

With the emergence of PT as a doctoring profession, questions have been raised as to whether PT educational programs are making the required changes to foster optimal student learning or if they are simply making changes without a thorough understanding of all of the quality measures that significantly impact overall program effectiveness and student outcomes.<sup>6</sup> For example, we often see mandates for students to reach specified achievement levels (i.e. grades and NPTE scores) at specific points in time but not as much emphasis on which resources need to be in place to make it possible; nor standardization of how PT educational programs are measuring these efforts. However, it is important for programs to consider how quality indicators such as teacher effectiveness, faculty scholarly activity and overall program length support the outcomes that they claim to promote. Program outcomes can then be a more useful aid in curriculum planning and in making assessment criteria more rigorous and accessible to learners in comparison to prior uses.<sup>24</sup>

Since the percentage of its graduates who successfully pass the NPTE is a metric used by PT programs to judge quality, this study sought to determine whether or not differences exists between NPTE outcomes based on PT faculty scholarship and PT program length. This study also explored the faculty behaviors of PT programs with high versus low NPTE 3YUPR outcomes and their respective results of a self-generated faculty survey created for the purpose

of this study. No attempt was made to explore student characteristics/behaviors due to an interest being only in aspects that PT programs can control for. Also, this study did not assess how program characteristics/faculty behaviors affected didactic grades because overall program quality is often determined by the final outcome (the ability to pass the NPTE). This chapter provides a summary of prior research on characteristics analogous with program and faculty quality and factors that impact student outcomes. A theoretical framework for which this study is based is introduced.

A literature review was performed using several sources (APTA, FSBPT, CAPTE, Bureau of Labor Statistics, Commission on Colleges, Carnegie Foundation for the Advancement of Teaching), scientific journals (Council of Higher Education, Journal of Physical Therapy Education, Physical Therapy Journal, Liberal Education, London Review of Education, Australian Journal of Physiotherapy, Clinical Management, Journal of Nursing Education, Allied Health, Distance Education and Learning Technologies, Journal of Quality Management, Journal of Teacher Education, Academic Medicine, International Journal of Nursing Studies, Higher Education Quarterly, Communications Disorders Quarterly, Medical Teacher, Cardiology Physical Therapy Journal , International Journal of Teaching and Learning In Higher Education, BMC Medical Education, Computational Biology, American Journal of Pharmaceutical Education, Medical Education, Journal of Athletic Training and the Journal of Dental Education), and books on teaching quality. Key terms/phrases used in search efforts included history of PT education, accreditation standards, student

competence, program quality predictors, student outcome measures, faculty scholarship, effective teaching, educational program effectiveness, effects of program length, contemporary practice, Annual Accreditation Reports, student assessment methods and the NPTE pass rates.

Previous studies have reviewed student, faculty and educational program characteristics to determine if they are significant predictors of NPTE outcomes.<sup>4-8,11</sup> The student characteristics studied were demographics (age, race, and sex), as well as pre-admission Graduate Record Examination (GRE) scores and Grade Point Average (GPA). The program characteristics studied were size (number of graduates per year), degree type offered, years of accreditation, program financial resources, curricular content, instructional methods, faculty degree, admission criteria, clinical education performance and comprehensive examination scores. Although the literature indicated that characteristics such as faculty scholarship, clinical education setting type and performance, student to faculty ratios, total program length and faculty turnover rates are all important factors in student knowledge retention and program quality, the findings were inconsistent and they did not show strong predictive relationships between these variables and NPTE outcomes .<sup>4,8-11</sup> It was thus important to continue to explore PT program characteristics that may serve as strong NPTE outcome predictors.

First, following a review of the literature, few studies were found addressing the predictability of total program length on NPTE success. Secondly, in the literature, faculty scholarship was viewed as important to student

advancement and program quality without quantifying the scholarly productivity of the faculty and its effect on NPTE success. The intent of this study was to continue this line of investigation on a broader scale to see if overall differences between PT faculty scholarship and PT program lengths are indicative of their respective NPTE outcomes. This study also intended to measure and distinguish faculty behaviors consistent with high NPTE 3YUPR using a self-generated faculty survey tool.

## **THEORETICAL FRAMEWORK**

This study was based on a sequenced framework of related PT educational program factors that may have direct or indirect relationships with NPTE outcomes. The framework begins with the advancement of the PT profession, which has led to a continuous need for the refinement of educational standards and training. With this, there are simultaneous expectations of improvement in program quality, which may be affected by both faculty (scholarship and effectiveness) and program (program length) and students' outcomes (NPTE).<sup>26-34</sup> PT student outcomes are commonly assessed or measured formatively in the classroom and the clinical settings and may predict student performance during later summative assessments, including the NPTE.<sup>31-33,35-37</sup> In turn, by having knowledge of these characteristics that have an impact on summative student outcomes, more accurate predictions may be made concerning potential student success.

## **A HISTORICAL PERSPECTIVE ON PT EDUCATION STANDARDS AND PROFESSIONAL TRAINING**

Physical therapy as a profession has grown significantly over the years in response to social and political changes. Since its origination in the 1800s following the poliomyelitis epidemics, the physical therapy (PT) profession has perpetually evolved to meet the demands of growing patient rehabilitation needs.<sup>38</sup> The need for physical therapy (PT) changed in response to the poliomyelitis epidemics in 1914 and 1916.<sup>39,40</sup> In 1916, the first major poliomyelitis outbreak took place with over 9,000 cases in NY State alone. Common treatment methods consisted of long-term splinting and bed rest, which both resulted in severe muscle atrophy and decreased mobility warranting the use of physical therapy treatment.<sup>39-41</sup> The professional advancement of PT was in part influenced by the Medical Department of the U.S Army.<sup>38</sup>

A report by the Division of Orthopedic Surgery required the establishment of hospitals for reconstructing soldiers with disabilities. Within this report, a section dedicated specifically to physical therapy, suggested the need for advanced care such as massage and mechanical hydrotherapy. It also suggested that standards should be established by PT programs and that graduates should be called reconstruction aides.<sup>38</sup> By 1917, there was a higher demand for therapy than there was an available supply of therapists. Consequently, the Office of The U.S. Army's Surgeon General, developed emergency training programs for reconstruction aides in 1918 to meet the demand.<sup>38</sup>

Despite the request for the development of standards, these certificate program courses lacked quality control and had poor regulations on the educational preparation of students. Admission requirements comprised of the completion of a secondary school education and a physical examination consistent with the requirements for service in the army. The curriculum was limited to short course lengths (four-month courses in theoretical and practical physiotherapy in two of the following modalities: hydrotherapy, mechano-therapy, massage, or electrotherapy. Students were required to complete 240 certified hours of active clinical work. Additionally, there was no standardization or accreditation and lack of monetary resources.<sup>38</sup> In 1928 the American Women's Physiotherapy Association of 1921 (name later changed to the American Physical Therapy Association in 1922), established the standards for the practice of physical therapy in the U.S.<sup>38</sup>

In 1935 the Social Security Act was enacted into law, and with the occurrence of World War II (WWII- 1939 to 1945), each state was required to broaden its PT services not only to children with poliomyelitis but to persons with other disabilities as well. <sup>38</sup> Both events caused the expansion of physical therapy services to outpatient clinics, homes, orthopedic hospitals, schools and more.<sup>38</sup> Thus, it was even more critical to improve and enforce PT educational standards. In 1936, with the support of the American Medical Association (AMA), the requirement for licensure changed from a certificate program to a baccalaureate program. The AMA solely developed and published the Essentials for Acceptable School for Physical Therapy Technicians, defining the quality measure criteria for



all faculty, and requiring the accreditation of each PT program.<sup>38</sup> Although a voluntary process, accreditation has historically been used in the U.S. to assure the quality of the PT education that students receive by determining whether or not a program meets set standards of competency, authority and credibility.<sup>42, 43</sup>

In the 1950s, the Korean and Vietnam wars resulted in further medical advances such as joint replacements to treat wounded soldiers.<sup>38,39</sup> PTs were now responsible for implementing rehabilitation techniques that required greater knowledge and skills to address the complexities of the orthopedic conditions presented as well as to address a growing elderly population.<sup>38,39</sup> Again, more stringent PT training standards were implemented to increase the breadth and depth of the curriculum to meet these needs. The previously established curriculum was expanded to include courses in neuro-anatomy, psychology, research, education, administration, and public health, which all helped to form the current foundation for understanding disease pathophysiology and treatment rationales.<sup>38</sup> Consequently, in 1960, the Baccalaureate degree became the entry-level standard across all PT educational programs in the US.<sup>38</sup>

New legislation such as the Hill Burton Act of 1946 facilitated a hospital based practice, and the 1990 Americans with Disabilities Act led to new opportunities for PT practice.<sup>40,41</sup> Concurrently, technological advances in health care resulted in the increased utilization of rehabilitative services, and hence the depth of knowledge required for physical therapy practice evolved to meet these demands.<sup>41</sup>

New and emerging health concerns such as the Acquired Immune Deficiency Syndrome (AIDS) and the post-polio syndrome continued to drive the need for educational programs that properly prepared PT providers.<sup>41</sup> This led to the latest entry-level requirement in PT education of a Master's degree in the 1980s then the doctoral degree in 1992.<sup>41</sup> As these entry-level requirements have changed, questions of whether current institutional and faculty qualifications are adequate or need to be elevated to meet the higher educational expectations such as understanding student learning types, pedagogy methods, curricular innovations, and the impact of technology on education have yet to be answered.<sup>44</sup>

Today, the Commission on Accreditation in Physical Therapy Education (CAPTE) is recognized by the U.S. Department of Education as the sole agency for accrediting physical therapist programs and it has gradually improved the evaluative criteria for quality programs and their outcomes.<sup>45</sup> Although accreditation is a voluntary process, its importance is made evident by the licensing laws required by each state. These laws mandate that only PT graduates from CAPTE accredited programs are eligible to sit for the National Physical Therapy Examination (NPTE) and obtain licensure for professional practice in the U.S.<sup>42,43</sup> Consequently, because of the quality of the educational preparation that they have received, only PTs with state issued licenses are deemed safe and competent to practice in the US. Additionally, regionally accredited universities must measure student-learning outcomes to achieve and maintain their degree-granting privileges.<sup>45</sup>

## **CURRENT HISTORY: TODAY'S CHALLENGES IN PHYSICAL THERAPY**

Measuring professional competence in physical therapy education is more important today because of the increases in economical stresses, health care coverage restrictions, direct access and the transition from the master's degree to the clinical doctorate in physical therapy as the entry-level degree. In recent years, the economic recession has partly affected health care spending, US employment rates and the federal budget.<sup>46-48</sup> Consequently, employers have sought to limit their exposure to the rising health care costs by shifting the cost to employees, requiring them to increase their contributions or by providing different forms of medical coverage.<sup>47</sup> In turn, Americans have begun cost-cutting by postponing needed healthcare including physical therapy despite the APTAs efforts to show that physical therapy can be a cost-effective way of improving health and wellness.<sup>49</sup>

Today's physical therapy professionals have more responsibility in terms of patient care.<sup>50</sup> There are increased numbers of private practices; clinical specialist opportunities (cardiovascular and pulmonary, clinical electrophysiology, geriatrics, neurology, orthopedics, pediatrics, sports, and women's health) and patients in most states are legally allowed to directly access physical therapy services without a physician's referral.<sup>50</sup> This gives consumers the opportunity to be evaluated and treated by a licensed physical therapist without first seeing their medical doctor for a prescription, thereby expediting treatment, relief, and recovery. However, these patients may have multiple co-morbidities and their

symptoms may not warrant physical therapy. Therefore PT program graduates need to be competent in contemporary practice standards and must be knowledgeable to safely and appropriately assess all body systems.<sup>46,51</sup>

These changing demands on the PT profession in turn require that PTs become more proficient in differential diagnosis, screening, examination, critical analyses and prognosis. Bella<sup>46</sup> and Dunfee<sup>37</sup> suggest that these requirements must first be acquired through a PT educational program's curriculum, which places emphasis not only on clinical and basic sciences but also on research, administration and clinical specialties. By ensuring that physical therapists are properly prepared, PTs can confidently practice in this changing environment while convincing stakeholders that PT services are needed and can be appropriately delegated as necessary.

## **STUDENT COMPETENCE DEFINED**

Before determining whether or not a physical therapy educational program is producing competent graduates, we must first define what competence means. Verma, Paterson, and Medves generally viewed competence as a behavior or set of behaviors that describe excellent performance in a particular work context.<sup>52</sup> They stated that in health care, competencies are used to define discipline, specialty standards and expectations and to align practitioners, learners, teachers, and patients with evidence-based standards of health care and performance.

In 2000, the Federation of State Boards of Physical Therapy (FSBPT) developed a document entitled “Standards of Competence” which was later revised in 2006 to articulate a measurable degree of required performances for PTs that are first introduced in the academic setting and assessed during clinical education.<sup>50</sup> These standards of competence conceptualize what may be used as accountability standards for ongoing practice. Competence was defined as the application of professional knowledge, skill and abilities, which related to performance objectives of an individual’s (PT) role within the context of public health, welfare and safety.<sup>50</sup>

FSBPT categorizes competence into two domains (professional practice and patient/client management). Within the professional practice domain, first, a PT must be accountable (i.e. practices in a safe manner; completes documentation appropriately and in a timely manner; supervises assistive personnel; consistently and critically evaluates sources of information related to PT; selects and utilizes outcomes measures to assess intervention results; and effectively communicates).<sup>50</sup> Secondly, a PT must demonstrate professional behavior (conduct critical self-assessment; demonstrate understanding and compliance with laws and regulations related to PT practice).<sup>50</sup> Lastly, a PT must demonstrate professional development through lifelong learning.<sup>50</sup>

Within the patient/client management domain, first, a PT should be proficient in examination, evaluation, diagnosis, plan of care development, intervention implementation, education (patients, family, and caregivers), and

discharges (consultations with patient/caregivers; coordination of ongoing care).<sup>50</sup> All FSBPT listed standards encompass the level of performance to which all PTs are held accountable immediately upon licensure and for ongoing practice.

Verma, Paterson and Medves conducted a systematic review of the literature that explored the discipline specific core competencies for health care professionals in medicine, nursing, occupational therapy and physical therapy in Canada.<sup>52</sup> The results for physical therapists were consistent with the standards of competence outlined by the FSBPT. They concluded that the six major areas of competency that PT graduates should achieve at licensure are 1) professional accountability, 2) client assessment, 3) diagnosis 4) intervention planning, 5) communication, and 6) organization.<sup>52</sup> Because the health care environment is changing at an unprecedented rate, the APTA now believes that continuous formal assessments of PT competency must be performed and modified to address the needs in different practice settings throughout a PTs professional career which will urge relevant decision-making at the institutional and national levels regarding academic policy and practice, accreditation, educational quality, professional licensure and other similar issues.<sup>53</sup>

## **CHARACTERISTICS USED TO DETERMINE PROGRAM QUALITY AND STUDENT OUTCOMES**

Although quality is something that most higher education stakeholders aim to achieve, its constructs are not readily understood and a consensus is difficult to forge. At the time of this study, current research findings did not consistently

define program quality and, to date, no one universally accepted operational definition has emerged.<sup>54</sup> Instead, program quality has historically been judged using three methodologies: 1) quantitative assessments on areas such as faculty productivity, program inputs, student outcomes; 2) reputational studies in which panel expert judge quality based on processes such as accreditation; and, 3) qualitative techniques to elicit from stakeholders what program quality means to them.<sup>54-57</sup>

However, in terms of physical therapist educational programs, CAPTE has established general guidelines of quality in the Evaluative Criteria for PT Programs.<sup>58</sup> CAPTE defines a quality educational program as one that prepares graduates for competent and ethical practice, career flexibility, and instills the values associated with the profession. Quality also mandates an educational experience that prepares individuals for lifelong learning, which is essential to future practice.<sup>13</sup> CAPTE's seven key points inherent in quality programs are 1) Consistency in how you enumerate throughout mission and philosophy that are congruent with and supportive of the institutional mission, 2) Policies, procedures and practices that protect the rights and safety of all those involved with the program, 3) An environment conducive to learning, 4) Sufficient resources to support the program and curriculum, 5) A qualified faculty, committed to effective teaching and student learning, to service and to scholarship, 6) A comprehensive and organized curriculum that leads to the development of the competencies necessary for entry into the profession, and 7) An organized method for obtaining and analyzing feedback from the community

of interest that allows the program to engage in assessment and continuous improvement.<sup>13(pg.v)</sup> This study indirectly measured factors from CAPTE's key point 5 (faculty commitment to effective teaching, service, and scholarship) to determine the effects on measures of student outputs (NPTE success).

Some higher educational institutions use the web-based Higher Education Research Institute's (HERI) faculty survey, which was designed to measure issues impacting faculty and administrators of two and four year graduate programs. These issues include institutional priorities, economical effects on faculty, faculty expectations of students, pedagogical strategies, sources of faculty stress and satisfaction, and faculty's ability to connect student learning in classroom with practice.<sup>59</sup> Similar constructs were examined in this study through the qualitative comparative analysis of graduate level PT programs using the results from a self-generated survey tool.

## **FACULTY BEHAVIORS**

### **Behaviors of effective classroom teachers/faculty**

Physical therapy faculty members participate in scholarship, teaching, and service, which enable them to generate and disseminate knowledge to peers, students, and external audiences. However, there are differences across institutions regarding the time spent in teaching, scholarship, and service, which is also impacted by the terms of each faculty member's appointment. Evidence from teacher-effectiveness studies and other literature identified faculty traits that may be conducive to student learning.<sup>60-65</sup>



In a descriptive comparative analysis, Tucker and Stronge summarized how 4 different school systems incorporated measures of student achievement when conducting teacher and program evaluations which enabled schools to focus attention on meeting higher standards. Teacher evaluations were linked to student learning by 1) setting quantifiable student academic progress goals annually, 2) tracking changes in student test scores, and 3) recording how desired student learning outcomes explained actual student learning. They also made a distinction between a qualified teacher and an effective teacher. A qualified teacher is one with a college degree; fully licensed/certified by the state in the subject they teach; and demonstrate competence in their teaching subject.<sup>60</sup> An effective teacher is one who is able to envision instructional goals and draw upon their own knowledge/training. They help promote students learning through the use of their skilled verbal ability, pedagogical knowledge and their ability to use a variety of teaching strategies skillfully and their enthusiasm for their subject.<sup>60</sup> Although quality and effectiveness are good traits, quality alone is simply a good foundation for effective teaching. Interestingly enough, PT educators have been drawn from clinical practice and many may not have had the prior knowledge of educational pedagogy that is necessary to effectively promote student learning. Tucker and Stronge imply that student achievement is linked to teacher effectiveness which should be studied further to determine specific teacher strengths or characteristics that are conducive to learning.

The Cooperative Institutional Research Program (CIRP) at the Higher Education Research Institute (HERI) published a summary report highlighting the

results of national (web-based) survey responses from 16,112 college and university faculty between 2013 and 2014 at 269 four year colleges and universities.<sup>61</sup> These surveys focused on areas of preferred teaching methods, faculty perception of institutional climate, time management, student interaction, primary sources of stress, personal and professional goals and teacher preparation.

Although this survey addresses undergraduate faculty, the results showed that 99.1% of faculty during the 2013-2014 academic term agreed that the development of a student's ability to think critically was very important.<sup>61</sup> Since 1989-1990, faculty have demonstrated a change in their pedagogical styles. The use of student selected topics increased from 8.5% in 1989-1990 to 26.3% in 2013-2014. Reliance on group projects have increased from 45.5% to 60.7%. This shows an increase in faculty diversifying teaching strategies as drop in the common lecture method has dropped by 5%.<sup>61</sup>

When developing student abilities to analyze data and interpret the meaning and significance, faculty in departments of math (26%), business (44.5%) and engineering (45.5%) were least likely to frequently assign students this type of work. In comparison, faculty in departments of history and political science (81.1%), English (75.8%) and biological sciences (70.3%) were among the most likely to facilitate student learning by understanding the meaning and significance of data.<sup>61</sup> Although there are no longer any U.S. based

undergraduate PT programs, this data does include teachers of science courses which serve as pre-requisites that PT students must take.

A retrospective study by Sanders and Rivers measured the effects of a teacher's influence on student outcomes. Data were collected from students as they progressed from 2nd graders in 1991-92; 3<sup>rd</sup> graders in 1992-93, 4<sup>th</sup> graders in 1993-94, and 5<sup>th</sup> graders in 1994-95 who had comparable achievement histories on the Tennessee Comprehensive Achievement Program (TCAP) math achievement tests.<sup>62</sup> Teacher effects were estimated from a longitudinal analysis by using a statistical mixed model approach that provided shrinkage estimation for the teacher effects. Low performing teachers were defined as those who poorly facilitated academic growth of his/her students as they advanced to future grades. Once the teacher effects were identified for each grade level, the distribution of teachers were randomly grouped into five equal groups (quintiles) with the teachers demonstrating the lowest degree of effectiveness in the first quintile and those with the greatest degree of effectiveness in the fifth quintile. By encoding individual student records with the teacher effectiveness quintiles for each grade (3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup>), the progress of individual students were traceable through identified sequences of teacher effectiveness. When taught consecutively by three high performing teachers, the children scored on average in the 96<sup>th</sup> percentile on Tennessee's math assessment test at the end of the 5<sup>th</sup> grade year. In contrast, 3<sup>rd</sup> graders who were taught consecutively by three low performing teachers, scored on average in the 52<sup>nd</sup> percentile in math.<sup>62</sup> This research showed that student achievement was influenced by the teachers'

effect. However, they mention that the student scores noted were “very highly significant” but no significance values were provided. Also, there was no mention of comparison controls or details on how they accounted for subject characteristics such as learning disabilities, repeating the same grade, changes in the home the environment or whether all faculty had access to the same resources; all of which may have altered the outcomes.

Darling-Hammond performed an extensive review of the literature to show the impact of teacher preparation on student success.<sup>63</sup> She concluded that there is consensus that teachers with more preparation for teaching are more confident and successful with students in comparison to teachers with less preparation. This was supported by teacher recruits with less preparation acknowledging that they have difficulties with planning curriculum, teaching, classroom management and understanding how to assess students’ learning needs. Darling-Hammond states that despite being intelligent and having enthusiasm for teaching, this cannot be easily accomplished without preparation.

Due to the criticism that educational programs have received for ineffective teacher preparation, different approaches to measure pedagogical knowledge more so than subject matter knowledge have been put in place for faculty recruitment purposes. Encouraged by the Holmes Group and the National Network for Educational Renewal, over 300 programs of education have created programs that extend beyond the traditional 4-year bachelor’s degree program.<sup>63</sup> This allows for the integration of extensive training in education studies. While some are 1 or 2-year programs for recent graduates, others are 5 year

undergraduate programs that dedicate the 5<sup>th</sup> year for teacher preparation.<sup>63</sup> This has led to graduates being viewed as effective and better prepared by colleagues.<sup>63</sup>

Simply having subject knowledge may not be enough to assure student learning. This is further supported by a teacher preparation study by Perkes who aimed to explore if a relationship existed between junior high school student achievement and the volume of academic preparatory work completed in the sciences (i.e. biology, physics, geology) by science teachers. Although the study explored junior high level teachers, the results showed that in depth knowledge of the art of teaching was more important to effective teaching and student learning than simply knowing the material.<sup>64</sup>

Rosenholtz, in his book, reported that inexperienced teachers (less than 3 years of teaching) were less effective than senior teachers who worked in settings that foster continual learning and collaboration.<sup>65</sup> However, students who attended 5-year teaching programs where they obtained a Bachelor's degree in a discipline, a Master's degree in education and 1 year in student teaching placements in comparison to those in traditional 4 year degree programs tend to be more confident and as effective as senior teachers. This foundational level of teacher education and training is not common in PT education.<sup>65</sup> Instead, traditional PT programs consist of obtaining an academic degree (typically in physical therapy) which does not place significant emphasis on the art of teaching. This leads to the question of how can new PT faculty provide quality teaching experiences if they have not been adequately prepared in the field of

teaching. This study explored pre-teaching training but also focused on post-graduate opportunities taken by established PT faculty that enhanced their skills such as teacher workshops and faculty mentoring.

### **Faculty qualifications in grade school versus higher education**

Along with the importance of teaching experience are each state's requirements for certification and licensure of grade school and higher education teacher candidates. Grade school teachers are required to have at least a Bachelor's degree. Also, if teaching in public schools, a state licensure must be obtained through a teacher education program accredited by the National Council for Accreditation of Teacher Education (NCATE) or the Teacher Education Accreditation Council (TEAC).<sup>66</sup> Faculty in higher education (4 year colleges and universities) are most often required to have a doctoral degree in their field. However, faculty candidates with lesser degrees are utilized at some colleges and universities for specialty or part time positions.<sup>67</sup> The Southern Association for Colleges and Schools (SACS), leaves hiring decisions up to each institution, but they recommend that educational institutions use guidelines to define faculty qualifications which include, 1) faculty teaching graduate and post baccalaureate course work having earned a doctoral or terminal degree in the teaching discipline or a related discipline, and 2) graduate teaching assistants having a Master's degree in the teaching discipline or 18 graduate semester hours in the teaching discipline, direct supervision by a faculty member experienced in the teaching discipline, regular in-service training, and planned and periodic evaluations.<sup>68(pg.1)</sup> Although it was noted that teacher qualifications

differed per state and institution, Darling-Hammond further explored qualification requirements and how it impacted student achievement.

Darling-Hammond examined how teacher qualifications and other school inputs related to student achievement across states using data from surveys of 50 states on policies, state case study analyses, the 1993-1994 schools and staffing surveys and the National Assessment of Educational Progress. To determine their impact on student learning, several areas of influence were reviewed including 1) subject matter knowledge, 2) knowledge of teaching and learning, 3) continuity of teacher learning, 4) teaching experience, 5) certification/licensure status, and 6) teacher behaviors.<sup>32</sup>

A noticeable difference was found between states that set high standards for teacher qualifications versus those with lower standards. For example, Wisconsin requires teachers to complete a bachelor's degree with a major in the subject area to be taught. It is noted as a high standard state which requires that prospective high school teachers complete coursework covering learning theory, child and adolescent development, subject matter teaching methods, curriculum, effective teaching strategies, uses of technology, classroom management, behavior and motivation, human relations, and the education of students with special needs. Also, a teacher must complete at least 18 weeks of student teaching under the supervision of another teacher who also meets minimum standards.

In opposition, in low standard states such as Louisiana, high school teachers can be licensed without having a major or minor in the field in which

they will teach. There is no requirement to study the curriculum, teaching strategies, classroom management, uses of technology, or the needs of special education students.<sup>32</sup> Prospective teachers can obtain a license after receiving only 6 weeks of student teaching. Aside from the standards, there is also a difference in the degree in which they are enforced.

When examining how this impacts student achievement, Darling-Hammond provides literature comparisons that show that since the 1980's, the U.S. dedicated increased investments (teacher certification/specialist training) in teacher preparation in the subject of reading ensuring that over 95% of teachers are fully certified. When compared to other countries, the students in the U.S. are comparable. However, among the mathematics teachers in the U.S., 30% have been teaching with less than a minor in their field or are uncertified. When compared to other countries, the U.S. students perform poorly.<sup>32</sup>

I further explored more current trends through use of the National Center of Educational Statistics and found that when compared to 1998, full time teachers in 2000 participated in less professional development for new methods of teaching (73% in 2000 vs. 77% in 1998); student performance assessment (62% in 2000 vs. 67% in 1998); and classroom management (45% in 2000 vs. 49% in 1998).<sup>69</sup> I was able to view mathematics scores in 2000 for Wisconsin and Louisiana for comparison to the scores reported by Darling-Hammond. Based on the national average score of 274, Wisconsin continued to be above average, scoring 287. Louisiana students continued to score below average at 259.<sup>69</sup> With teachers showing less involvement in professional development



nationally, one would expect all programs to show lower averages. With Wisconsin continuing to score higher, I would assume that this value is attributed to differences in individual state standards.

Similarly, each PT educational institution is responsible for ensuring that faculty quality criteria set by CAPTE are met. Simply having a doctoral degree should not be the sole factor in determining if a faculty candidate is qualified. CAPTE recommends that they also demonstrate evidence of additional clinical expertise, specialty expertise or advanced training in their teaching subject.<sup>3</sup>

Darling-Hammond provided insight on quantifiable evidence that teacher qualifications can directly impact student achievement and therefore colleges/universities should take additional steps to ensure that standards for faculty recruitment are also conducive to student learning. This further supports this study's question of whether or not the standards for PT educators are sufficiently rigorous because of the demonstrated impact of teacher quality on student outcomes.

### **The importance of scholarship (research-informed teaching) when assessing teacher effectiveness**

In order to answer the question, "who am I as a teacher?", a qualitative research study by Velde, Wittman, Carawan, Knight, and Pokorny used the process of 3 dialog based (preliminary, transitional and fundamental) investigative meetings to explore the relationship between biases and assumptions of effective teaching with insight from personal experiences.<sup>70</sup> There were a total of five subjects (2 occupational therapists, 1 nurse, 1 health educator and 1 social

worker). Each took 20 photographs that self-reflected what “who am I as a teacher” meant to them. A preliminary dialog was conducted which involved exploration and sharing of personal experiences captured in the photographs to facilitate awareness of biases and assumptions. A transitional dialog followed involving the identification of emerging themes. Lastly, the fundamental dialog was completed involving the teachers collaborating to develop the final 7 themes.

The teachers came to a consensus on 7 traits of effective teachers. These traits were 1) judge, 2) bridge to learning, 3) affected by temporality, 4) user of the environment, 5) works through challenges, 6) lifelong learners, and 7) researchers.<sup>70(pg50)</sup> Of the 7 traits, the theme of researcher incorporated creating knowledge individually and with students and colleagues. The photographs used to create this theme consisted of written work, a co-authored book, conference presentations, students presenting graduate research, academic insignia, and diplomas.<sup>70</sup> From this, all participants agreed that demonstrating skills as a researcher was pivotal in their growth as an effective teacher.<sup>70</sup> Although the research was important in showing that the teachers viewed themselves as researchers, it was limited by placing no focus on whether the quantity of research activities played any part in student success. Also, all 5 researchers also served as the sole participants in their own study. This could have caused a bias in data collection due to the Hawthorne effect where responses are modified in response to their awareness that they are being studied.

A second study by Berk explored and critically examined the value of 12 strategies on faculty evaluation to determine which strategies better measured

teacher effectiveness.<sup>71</sup> Berk evaluated effectiveness by looking at assessment tools and outcome measures such as student ratings, peer ratings, self-evaluations, video, student interviews, alumni ratings, employer ratings, administrative ratings, teaching scholarship, teaching awards, learning outcome measures, and teaching portfolios.<sup>71</sup>

Student ratings were noted as being necessary and one of the most common forms of faculty evaluations but not the most accurate in determining teaching effectiveness. Student ratings are mostly complemented by peer ratings of teaching performance and materials because it covers aspects of teaching that students are not in a position to evaluate. Self-evaluations are important in allowing faculty input on their own teaching which completes the triangulation of the three sources of direct observation of teaching performance (students, peers, and self).<sup>71</sup>

The use of video, when interpreted alone or with peers can be used as a source of evidence for formative decisions. Student feedback as well as alumni ratings can be a good source for ideas on improvements needed in teaching, courses, and curriculum admissions. The teaching portfolio can be used to display a comprehensive picture of teaching effectiveness but as a complement to the list of research publications. Berke states that teaching scholarship, however, serves as an important source to discriminate the teacher scholar from all others.

The study provided a unified conceptualization of teaching effectiveness through the use of multiple data points. It emphasized that faculty presentations

and publications (scholarship) were important sources of evidence to supplement other assessment tools and outcome measures that indicated teaching effectiveness.<sup>71</sup> This in part, supported the need for the survey tool developed for this study which further examined how student outcomes are impacted by teaching effectiveness and the types of evidence that may be important in evaluating faculty scholarship.

Berke also stated that student learning outcome measures should be used cautiously as the primary source of evidence for faculty evaluation. This is based on the premise that student and institutional traits can have an effect on student performance irrespective of what faculty do in the classroom. Student traits may include ability, attitude, motivation, age, gender, and maturation. Institutional traits include class size, classroom facilities, available technology learning resources, and school climate <sup>71</sup>

The literature shows that there are numerous factors that contribute to effective teaching such as teacher preparation, experience, training, certification and knowledge of pedagogy and subject matter.<sup>70-73</sup> However, the trait that is not as well researched is faculty scholarship and its relationship to effective teaching and student learning. Based on these facts, additional research was performed in this study, which explored faculty scholarship in more depth.

### **The faculty dilemma: creating synergy between teaching and scholarship**

Research-informed teaching is defined as the linking of research with teaching with the aim of broadening the scope of learning and teaching within a

university.<sup>74</sup> Although faculty are traditionally expected to have doctoral degrees, doctoral study does not always equip graduates with the range of transferable skills required to become leaders in research in practice or academic areas. Early in a student's education, he/she may question his/her knowledge of a topic when making decisions concerning his/her own practice. Dey, Milson, Roddam and Hart believe that through research-informed teaching, students should learn to utilize evidence to identify and integrate scientific knowledge as they progress academically with faculty ensuring that the curriculum supports the development of competencies, enabling students to implement research findings in their careers.<sup>75</sup> They published a book describing how academic programs and individuals within the school of public health and clinical sciences at the University of Lancashire embraced the daily practice and character of research-informed teaching of academics. They provided an insightful introduction into how research-informed teaching is central to the effective delivery of curricula to enable students to become lifelong inquirers and researchers.

They referenced the Lancashire Physical Therapy Program and how students are directed towards an overview of the current evidence for various clinical assessments and how therapeutic interventions reflect the realities of clinical practice.<sup>75</sup> This offered a model for blending faculty scholarship with quality teaching in that the faculty conducted research with direct links to the subject matter within the undergraduate physical therapy program such as biomechanics. Results were shared with fellow staff and students. Actually, due to the CAPTE requirement for faculty to demonstrate competence in subject

areas taught, this model is often used by current PT programs by providing opportunities for faculty to link research, education and clinical knowledge for interactive learning.

Another aspect of this model, was that the critical appraisal skills for research literature is taught in a cumulative fashion in which different modules are used at 3 levels. Level 1 modules teach students to recognize that physical therapy practice should be supported by research evidence.<sup>75</sup> By reading research literature related to case studies, the students are able to identify gaps in the evidence-base. Students are then evaluated on their ability to comprehend the impact of the research on therapy practice.<sup>75</sup> At level 2, research papers are used throughout the curriculum to improve students' reading skills, knowledge-base and the use of research to inform their practice.<sup>75</sup> At level 3, independent study modules and a research module are used in which students are expected to refer to the evidence throughout their coursework.<sup>75</sup> They must examine the processes involved in creating evidence-based clinical guidelines and understand the role of the National Institute for Clinical Excellence.<sup>75</sup>

During clinical practice placements, students are asked to acknowledge the evidence for effectiveness of therapy which provides a realistic problem-based learning experience.<sup>75</sup> Also, all students are encouraged to attend a weekly inter-disciplinary Journal Club that focuses on creating a environment where students can share ideas and interact with each other and course tutors.<sup>75</sup>

In the Lancashire model, Undergraduate Research Internships are available to provide students with the opportunity to conduct research that is

supervised by members of the Allied Health Professions Research Unit.<sup>75</sup>

Through participation in these internships, students gain experience in applying for IRB approval; develop technical expertise directly relevant to their studies; develop skills in academic writing, time management and planning.<sup>75</sup> Results of these study findings have generated new evidence to inform practice and have been used to update the teaching content of the physical therapy program.<sup>75</sup>

Although Dey, Milson, Roddam and Hart have provided a detailed view of how one physical therapy program has merged both teaching and scholarship, which is still currently being used by Lancashire, there was no quantifiable data on student outcomes.

Although some PT programs require students to complete research projects, others only require that students become familiar with reviewing literature and studying the research process. CAPTE does not set a requirement for student research projects. Instead, it states that the curriculum should include content and learning experiences necessary for initial professional practice which includes clinical reasoning, evidence-based practice and applied statistics which are to include laboratory and practical experiences.<sup>45</sup>

The literature provides the opinions of those who believe teaching and scholarship should be combined. Three professors of economics at the University of Bristol and the University of Dundee expressed their belief that good research and good teaching go together because they are both driven by enthusiasm for the subject being taught.<sup>76-77</sup> Another benefit in bringing research into the class is that the teacher is expositing work that he or she owns and

knows intimately and believes to be important. From a student's perspective, there is a sense of satisfaction that comes from knowing that he/she is being taught by the source of the information, which enhances their willingness to believe and grasp the material that the teacher provides. <sup>78-80</sup>

Despite these positive opinions about the synergy between teaching and faculty scholarship, some believe this emphasis on a scholarly agenda potentially takes time away from student teaching.<sup>81</sup> However, Vincens and Bourne explained that effective teachers strictly budgeted their time for teaching and research to prevent imbalances from affecting the quality of their teaching and the progress of their research. By example, they suggested for teachers to strategically separate their time to dedicate mornings to course preparation; afternoons to experimenting and manuscript writing while avoiding underestimation of time needed to fulfill office hours and grading.<sup>79</sup> They also believe that the primary goal of teaching should be to get students to think like researchers even if they can only apply their skills to simpler problems.<sup>79</sup>

Although research and teaching is a popular theme amongst educational programs, a unified definition is difficult to establish. To gain an understanding of the different ways in which research and teaching can be linked to promote student learning, Visser-Wijnveen et al conducted a study to investigate the variation in ideal images held by academics from the field of humanities. A stratified sample of 30 academics from the faculty of humanities of Leiden University and from different disciplines (history, linguistics, and literature) was used. Each subject/teacher had to have both teaching and research duties.<sup>80</sup>



All subjects were interviewed using a mental visualization assignment in which they described the ideal linkage between research and teaching by providing a detailed blueprint of their ideal situation. Guiding questions were provided and used as needed, to encourage each subject to describe the situation in more detail. Data were analyzed in three stages. First, a code-book was developed where each interview was organized into phases that represented an idea. This was repeated until saturation was reached. Secondly, all transcripts were coded holistically. Thirdly, patterns in data were obtained. The results revealed four essential themes (orientation, approach, curriculum, and teacher role). These themes were later defined as 5 points of interest. The points were, 1) the researcher is able to test their own ideas and students are informed about the state of the research field, 2) ensuring that students discuss and report (research teachers use examples from their own research), 3) show what it means to be a researcher (researchers function as role models by relating their own experiences and incorporating research practice into their teaching), 4) help to conduct research where students are challenged by being given small research assignments and teachers use their ongoing research in teaching, and 5) provide research experiences by using ongoing research in which students are trained to become researchers and teachers.<sup>80</sup> The study was limited to the subject's ideal images of research linked with teaching. There were no further explorations into whether these images were actual representations of the subjects. It would have been beneficial to see what restrictions or lack of resources may have limited subjects from participating in such activities.

Current frameworks of research-informed teaching do not adequately facilitate reflection or innovation in healthcare teaching because they do not encompass the notion of student as practitioner. Tcholakava, Georgieva, and Ivanov suggest a complementary framework that acknowledges the student as both the researcher and practitioner which highlights the dynamic interaction between research, teaching, and practice.<sup>74</sup> The proposed frame consists of, 1) Integrating teaching and research through the use of current research evidence within teaching materials; developing student skills in undertaking research; comparison of different research designs to inform evidence base; use of staff research to inform students about the professional knowledge base; discuss evidence base to stimulate the development of student research, 2) Developing student's skills in critical inquiry by identifying evidence; integrating and interpreting evidence to inform decisions about practice; identifying gaps in knowledge/evidence; increase capability to become life-long learners, 3) Highlighting links between research and practice by developing student skills to facilitate adoption of evidence based practice into workplace among professional groups; promoting collaboration between academia; transforming work experiences into priorities for research; conducting practice-informed research, 4) Evaluating and monitoring teaching methods through use of course team review of curriculum against current occupational competencies; consultations with and feedback from students, public and employers; development and evaluation of teaching tools and innovations.<sup>74</sup>

Haslett used a health and wellbeing course on cardiovascular physiology as an example of how to marry research and teaching. The course taught students how to monitor blood pressure and to review how it is supported by relevant research on guidelines for interventions for hypertension. By asking the students to link their knowledge about blood pressure monitoring with clinical research guidelines on hypertension intervention, both teaching and research were combined to ensure the best in clinical practice.<sup>82</sup> In order to integrate teaching and research, faculty must first have clear knowledge of the course subject in which they teach; be actively involved in conducting or reviewing research in their subject area; and have familiarity with instructional formats that involve integrated learning. There should be further exploration on the percentage of PT faculty who possess these traits.

Healey goes on to further define the scholarship of teaching as the engagement of research with teaching and learning but also as a critical reflection of practice and communication and dissemination about the practice of one's subject.<sup>83</sup> In Healey's study, references to Boyer describe how the scholarship of teaching is separated into four areas (discovery research, integration, service and teaching) and is achieved first, by understanding that good teaching means that faculty, as scholars, must also be learners. In becoming a successful teacher, one must obtain knowledge in three domains, including 1) the instructional domain which describes knowledge in the area of instructional design, 2) pedagogical knowledge which is what we know about

how students learn, 3) curricular knowledge which describes the goals, purposes and rationale of a course or program.<sup>84,85</sup>

Secondly, the scholarship of teaching must be viewed separately from having a scholarly approach. A scholarly approach to teaching entails being familiar with the latest ideas in one's subject and staying abreast of current ideas for teaching that subject. It also involves evaluating and reflecting on one's teaching practices and student's learning. On the other hand, the scholarship of teaching has the same definition as a scholarly approach but also encompasses communication and dissemination about the teaching and learning. Therefore, we must understand how to merge the two concepts and link them to the disciplines. Healey believes that developing the scholarship of teaching will only create change if embedded in supportive disciplines and departments. Moses similarly demonstrated that attitudes to teaching and research tasks and communication patterns differ in different disciplines.<sup>86</sup> With this understanding, some teachers may demonstrate some aspects of scholarly teaching while faltering in others.

Some teachers fully practice the scholarship of teaching by seeking to understand teaching better; consulting the literature; investigating their own teaching; reflecting on their intentions and student learning; and communicating their ideas and practice to their peers. Meanwhile, other teachers show no awareness of the literature and ideas on teaching/learning in their discipline in the way they teach; they do not reflect on their teaching practices nor their students' learning and do not discuss their teaching with colleagues. Healey

believes that the average teacher falls somewhere between the two extremes. To be scholarly, teachers must use the same thought process in their teaching as they do in research. A scholarly approach is to stay abreast of current literature and to act on the findings.

### *Public health*

The increasing emphasis from university administrators, governmental agencies, legislators, and the public to increase the scholarly activities of faculty members in colleges of health sciences because of the impact of their research on public health and wellness appears to be aligned with the current concepts related to evidence-based teaching.<sup>88</sup> This in turn requires the faculty in programs such as dentistry, medicine, nursing and pharmacy to balance their time between research, teaching and service which possibly should have a patient care/clinical focus.<sup>88</sup>

Rothstein, Brueilly, and CAPTE support the broad definition of scholarship that was proposed by Boyer.<sup>17,25,27</sup> Boyer recognized that scholarship must be integrated, applied, and taught to be fully accepted into the body of knowledge.<sup>84</sup> Despite the limited literature on this subject, the American Physical Therapy Association (APTA) has also highlighted the importance of research through its Vision statement (adopted in 2013) for the future of physical therapy drafted by APTA's House of Delegates in 2000.<sup>87</sup> One element of this statement includes the translation of evidence into practice. Evidence-based practice is defined as access to, and application and integration of evidence to guide clinical decision making to provide best practice for the patient/client.<sup>87</sup> Evidence-based practice

includes the integration of best available research, clinical expertise, and patient/client values and circumstances related to patient/client management, practice management, and health care policy decision making.<sup>87</sup>

### **Scholarship in PT education and the nursing discipline**

Many faculty members have doctoral degrees but this does not mean that they are academically prepared to perform research. CAPTE indicates that individuals holding a terminal degree may be qualified as a member of the PT program faculty when they also demonstrate proof of advanced training and clinical expertise in the area of their teaching responsibility as well as ongoing scholarship.<sup>25,45</sup> Meaning, core faculty should demonstrate expertise through scholarship that includes peer-reviewed presentations and publications related to their area of teaching. Hence the need for this study, to explore how PT faculty scholarly activity impacted student outcomes.

### *Physical Therapy*

Mohr et al conducted a study to examine the effects of educational program characteristics on the NPTE pass rates to identify benchmarking criteria for quality indicators. A total of 132 directors of CAPTE accredited programs in the U.S. were surveyed. A total of 21 independent variables (including number of faculty with Ph.D. and Ed.D degrees) were compared to the NPTE pass rates for each program. Pearson product moment correlations determined the variables that predicted NPTE success.<sup>8</sup>

This study provided a regression model, which indicated that faculty with doctoral degrees ( $P = 0.000$ ) and two other variables (accreditation status ( $P =$

0.000) and years of pre-professional and professional coursework combined ( $P = 0.006$ )) best predicted the pass rate on the NPTE. However, the results of this study indicated only a weak correlation between the NPTE pass rates and the number of faculty with Ph.D. and Ed.D degrees ( $R = 0.336$ ,  $P = 0.000$ ) and the coefficient of determination was low ( $R^2 = 0.113$ ).<sup>8</sup> Although these results highlighted the complexity of the teaching and learning process, this study did not explore the actual amount of scholarly activity that each faculty member completed and the effect on NPTE outcomes.<sup>8</sup> Additional research was needed and therefore this researcher sought to further investigate this relationship.

A second study by Palmer investigated benchmarking metrics that could be used by entry-level PT educational programs to compare quality improvement. It also aimed to determine if PT programs in different tier levels (tier 1 programs ranked in the top third of all accredited physical therapy programs and tier 3 ranked in the lower third) differed in curricular model and degree offered based on FTPRs on the NPTE. Metrics were successfully obtained from 51 CAPTE accredited entry-level PT education programs between 1997-1999 in the U.S. and Puerto Rico from a subset of 14 variables (total semester hours, program length in years, clinical rotation length, course contact hours, faculty academic degrees, faculty research productivity, faculty clinical specializations, faculty time in clinical activities, minority enrollment percentage, student-to-faculty ratio, average FTPRs on NPTE, program cost, pre-admission GPA and graduate employment rates).<sup>90</sup>

Discriminant analysis results showed that 51% of the variance between tier 1 and 3 could be accounted for by the 14 variables.<sup>90</sup> Further analysis (using canonical correlations) was performed to determine which variables contributed most to the predictive model. The results showed that the four variables that contributed most to the predictive model were contact hours in differential diagnosis, adjusted cost per student, percentage of minority enrollment, and research productivity of the faculty evidenced by a score of  $r = 0.716$ .<sup>90</sup>

Regarding the relative contribution of each variable to predict the first time pass rates, the first time pass rates were positively influenced by the number of course contact hours in differential diagnosis ( $r = 0.510$ ), minority enrollment percentage (0.337), and negatively influenced by program cost ( $r = -0.469$ ), and faculty research productivity ( $r = -0.296$ ). These 4 independent variables contributed the most to the prediction of NPTE pass rates in this model.<sup>90</sup> A Wilks' lambda test score of 0.488 indicated that 49% of the variance was not explained by group differences.<sup>90</sup>

Although the results showed an inverse relationship between faculty research productivity and student success on the NPTE, the correlation coefficient is weak and warrants additional research. Also, several school directors who participated in this study admitted that their returned questionnaires were completed using estimated instead of factual numbers. These facts made the results of this study questionable as to how much of the data indicated a true representation of the population.<sup>90</sup> Other literature supported the importance of scholarship in PT programs but they are based



solely on expert opinions.<sup>17,29,77</sup> Through the use of the AAR, the first source of data for scholarship information, this current study was able to make more reliable analyses of these relationships.

### *Nursing*

Faculty scholarship is also eminently valued by other disciplines such as nursing.<sup>91</sup> Nursing programs follow the guidelines of the American Association of Colleges of Nursing (AACN). Similar to the CAPTE requirements, AACN requires each faculty member to have a research agenda, find funding and conduct research while concurrently addressing the student education mission.<sup>88,89,92</sup> Consequently, a faculty candidate is assessed based on their research trajectory, current published findings, and their self-established plan for research advancement.<sup>88,92</sup> Unlike PT programs, some nursing programs prefer faculty who have completed a post-doctoral fellowship because they are expected to be further along in their research trajectory.<sup>88,92</sup> The CAPTE criteria is silent with regard to requiring faculty with post-doctoral fellowships.

## **PHYSICAL THERAPY PROGRAM CHARACTERISTICS.**

### **Program length in PT education and other disciplines**

Although there is no set requirement for optimal PT program length, the 2010 APTA fact sheet shows that the average program length for PT programs has gradually increased from 106.4 total weeks (77.3 class/lab and 29.2 clinical) in 2001-2002 to 120.1 weeks (85.3 class/lab and 35.1 clinical) in 2009-2010.<sup>93</sup> CAPTE guidelines for PT program development documents that a PT program

varies between 3 to 4 years in length.<sup>94</sup> CAPTE also documents either a 4+3 model where students enter a 3 year PT program after completing a 4 year bachelor degree or a 3+3 model where students transfer into a PT program after 3 years of undergraduate education.<sup>94</sup> No studies were found that addressed the relationship between PT educational program length (didactic/clinical) and NPTE success. This study distinguished between program length, didactic and clinical weeks, and NPTE success.

### **Program length in nursing education**

A study of 298 nursing graduates of 5 distinct associate degree nursing programs in Florida found predictive associations between student learning and performance on the Assessment Technologies Institute (ATI) Achievement Exit Exam and the National Council Licensure Examination for Registered Nurses (NCLEX-RN).<sup>95</sup> This study compared 5 programs which included the Bridge full-time (12 months), Bridge part-time (24 months), Generic part-time (15 months), Generic full-time (15 months) and the Accelerated Option (12 months).<sup>95</sup> The results of an ANOVA indicated that there was a significant difference between the program lengths ( $p = 0.006$ ) and performance on the ATI exam.<sup>95</sup> Additionally, the shorter length (12 month) program resulted in students with higher pass rates on the NCLEX-RN (96.2% score average) in comparison to a longer length curriculum such as the 24 month Bridge part time, which had an average student score of 64.3%.<sup>95</sup> This study controlled for student GPA, course grades, age, gender, race, entrance exam and adult basic education scores.<sup>95</sup>

Although, results indicated that a shorter program length resulted in higher pass rates on the NCLEX-RN; the study was conducted in only one nursing school, making it difficult to generalize the results. However, the sample size, consisting of 367 students over a 3 year period increased its statistical power.<sup>95</sup> One factor that may have been influential in student scores is that the shorter length programs could be related to greater student knowledge retention.

### **Program length in medical education**

Kerfoot et al believed that the primary goal of medical education is to generate long term learning, not just memories which are lost quickly after a given lecture or test.<sup>96</sup> They conducted a study based on the theory that educational encounters which are spaced and repeated over time result in more efficient learning and improved learning retention compared to massed distribution of the educational encounters. Their purpose was to determine whether spaced education improved the retention of student learning.

One hundred fifty six 3<sup>rd</sup> year, Harvard medical students in the 2004-2005 cohort were recruited by email to participate. No exclusion criteria were established. Based on the urology curriculum, four core topics (prostate cancer (PC), screening with prostate-specific antigen (PSA), benign prostatic hyperplasia (BPH), and erectile dysfunction (ED)) were used to create a 28 item multiple-choice test whose content validity was established by a panel of medical educators, urologists and physicians. Construct validity was established by administering the test to 19 urology experts. Internal consistency was measured

by Cronbach's alpha ( $\alpha = 0.76$ ) and a one-week, re-test reliability ( $\alpha = 0.72$ ). The 28 item test was used as the pre-test, post-test and end of year test.<sup>96</sup>

Harvard medical students are required to complete a 1-week clinical rotation in urology and a web based teaching program on the 4 core urology topics during their month-long surgery clerkship. For their study, both before and after the week, students completed the 28 item test. Randomization and cohort assignments were performed by one investigator. Students were stratified by gender, hospital and dates of clerkship and underwent blocked randomization to 1 of 2 study groups. For cohort A (PC/PSA), after completion of the urology rotation, they were sent educational emails each week on topics of PSA screening and PC. The same was done for cohort B (BPH/ED), with topics of BPH and ED. Emails consisted of clinically relevant questions followed by the answers, a summary of a teaching point, and an explanation of the answers.

The effect of this weekly follow-up method was assessed by comparing the two composite end-of-year test scores via a paired t-test, each student serving as their own control. Multiple linear regression models were used to analyze the end of year scores separately for the two cohorts and to analyze the score changes from post rotation to end of year. A post-hoc exploratory analysis was performed to examine potential systematic differences in the spaced educational emails utilized in the cohorts. Results indicated that the spaced emails significantly improved composite end of year scores via ( $p < 0.001$ ) paired t-test and Cohens effect size ( $d = 0.50$ ). The effect of weekly spaced emails was

greatest for those receiving them for 6-8 and 9-11 months (Cohens effect sizes of  $d = 1.01$  and  $d = 0.73$ ), and remained significant ( $p < 0.001$ ) even after adjusting for topic (PC/PSA versus BPH/ED), gender, site of clerkships, date, degree type). A significant interaction between spaced education and date of clerkship was found ( $p = 0.10$ ). Overall, this study demonstrated that frequent feedback that is spaced over time can improve student's retention of medical knowledge; however, optimal time has yet to be determined.<sup>96</sup>

### **Program length in Athletic Training education vs. certification examination pass rates**

Harrelson used 52 athletic training students enrolled in the same undergraduate program for an average of 7 semesters and who maintained a minimum GPA of 2.5 on a 4.0 scale.<sup>97</sup> The study sought to determine which independent variables (overall GPA, gender, number of semesters at the university, academic minor, minor GPA, fraternity/sorority affiliation, ACT scores, teaching versus non-teaching degree track) were predictive of first time pass rates on the National Athletic Trainer's Association Board of Certification Examination (NATABOC).<sup>97</sup>

The results of the forward multiple linear regression indicated that no single independent variable predicted examination success, a multiple discriminate analysis found a interrelationship between 5 of the 9 (overall academic GPA, athletic training GPA, academic minor GPA, ACT composite score, and the number of semesters of university enrollment) variables and the

number of attempts to pass the NATABOC ( $p = 0.01$ ,  $f = 3.36$ ,  $R^2 = 0.26$ ).<sup>97</sup>

Although the results did not specify the number of semesters of academic enrollment alone that could predict exam scores, it indicated that program length may have an effect on exam success, but additional studies are needed to support this assumption.

### **Length of clinical education programs and types of clinical settings**

#### *Physical Therapy*

Martorello explored the perceptions of Clinical Coordinator of Clinical Education (CCCEs) with regard to the optimal length of full time clinical education (CE) experiences for PT students completing their first and final full time clinical experience.<sup>98</sup> A pilot study using an open-ended questionnaire was sent to 273 CCCEs who had agreements with the American International College. The questionnaires consisted of 2 open-ended questions, 1) What is the optimal length for students first full time clinical experience in their facility and why?, and 2) What is the optimal number of weeks for final full time clinical experiences in their facility and why?

One hundred and fifty five of the 273 questionnaires were returned with 43% from outpatient settings, 19% acute, 15% sub acute, 15% rehab/specialty, and 8% home health and pediatric. Face validity was obtained by data triangulation which resulted in a consistency in responses suggesting agreement with the distribution of data in the biannual report compiled by CAPTE. Results

showed that an average of 7.3 +/- 2.26 weeks were suggested by the CCCEs for first full time CEs ranging from 3-16 weeks. For the final CE, the average suggested length was 9.1 +/- 2.09 weeks ranging from 5.5 to 16 weeks. These lengths were chosen based on the opinions that students would be able to see a patient through a full course of treatment; an 8 week experience is comprehensive enough for students have enough time to be competent to practice as a new graduate in their setting; and more time would not benefit the student further.<sup>98</sup>

The CCCEs' perceptions of the ideal time period allocated for the final CE differed. The results showed a bimodal split in distribution for recommended time periods for first full time clinical education experiences. The two modes were divided between 5-8 weeks and 9-12 weeks. CCCEs from acute settings indicated that a 5-8 week CE is optimal for the final CE, while CCCEs in the home health and pediatric settings advised a 9-12 week CE, indicating their opinion that students in the homecare/pediatric settings required more complex skills and critical thinking to gain acceptable skills for entry into the profession.<sup>98</sup> Despite the numerical values given for clinical program length by settings, this study consisted only of the opinions of CCCEs and provided no statistically significant findings that these values had any actual impact on student success. Therefore, additional research concerning program length was further explored in this study.

### *Dentistry*

Mascarenhas et al focused on the length of the clinical portion of the curriculum only.<sup>99</sup> This study investigated the clinical care at the Boston University School of Dental Medicine comparing the number of procedures performed by students completing 6-week dentistry clinical internships (1,898 procedures) and those completing 10-week dentistry clinical internships (2,644 procedures).<sup>124</sup> The results indicated that the scope of services provided in the 10-week internship differed from the 6-week internship because of the longer durations of the internships ( $p=0.0002$ ).<sup>124</sup> Additionally, the longer internships allowed students to perform more complex procedures toward the latter part of their internships.<sup>99</sup>

Weeks 1 through 6 were then compared for both groups of students. The mean number of procedures provided by the 10-week interns was  $178 \pm 74$  and significantly more than that of the 6-week interns ( $119 \pm 64$ ) over the first 6 weeks of the internship ( $p=0.04$ ).<sup>124</sup> Based on the results of this study, Mascarenhas et al determined that “longer internships resulted in greater clinical productivity.”<sup>99</sup> This study only examined the scope of procedures that students were able to complete based on internship length. One could argue that a smaller list of procedures within the same time frame could allow for better knowledge retention.

### **Translating contemporary practice guidelines to clinical practice**

In 2003, a report by the Institute of Medicine provided guidelines for developing strategies for restructuring clinical education to be consistent with the



principles of the 21st-century health system.<sup>100</sup> This report provided guidelines for “doctors, nurses, pharmacists and other health professionals” to enhance assessment methods of ongoing proficiency and adequacy of student preparation to provide the highest quality and safest medical care possible. It also provided a vision for all health care professional education in the 21st century.<sup>100</sup> Five core areas of proficiency that were outlined in this report were 1) delivering patient-centered care, 2) working as part of interdisciplinary teams, 3) practicing evidence-based medicine, 4) focusing on quality improvement and 5) using information technology.<sup>100</sup>

The importance of keeping abreast of current practice was also emphasized in a study by Hickey et al who reviewed the cause behind deficiencies in the quality of patient care and safety rendered by graduates of nursing’s entry level baccalaureate programs. They also reviewed and compared an entry-level baccalaureate nursing program that integrated the competencies developed by the Institute of Medicine to formulate a new curriculum for current programs.<sup>101</sup>

In 2010, both employers and new graduates voiced complaints of student weakness in the ability to provide care for multiple patients simultaneously, to perform advanced technical skills, and to prioritize and communicate effectively.<sup>101</sup> Upon close review, it was noted that although healthcare had advanced with additional knowledge and new healthcare settings, the curriculum had not been significantly altered for approximately 10 years in terms of subject area emphasis that reflected contemporary practice.<sup>101</sup> Although the number of jobs and

healthcare needs were in the adult population in medical, surgical, and ICU settings, the curriculum continued to place greater emphasis on pediatrics, obstetrics, and psychiatrics. This time period coincided with declines in the NCLEX-RN pass rates.<sup>101</sup>

The Institute of Medicine's report recommends that nurses engage in lifelong learning to gain the competencies needed to provide care for diverse populations across the lifespan. Also, to develop and prioritize competencies so curricula can be updated regularly to ensure that graduates at all levels are prepared to meet the current and future health needs of the population.”<sup>102</sup> Similar to PT program requirements, each nursing program is charged with determining and assessing its own clinical sites to ensure the clinical experiences for students provide, 1) Patients from diverse backgrounds, cultures, and of differing gender, religious, and spiritual practices. 2) The continuum of care, including population focused care, 3) All age groups, including the very young and the frail elderly, 4) Comprehensive learning opportunities to promote integration of baccalaureate learning outcomes that prepare the graduate for professional nursing practice.<sup>103</sup>

In nursing as well as in PT education, healthcare education reform has been advocated as a mechanism to address these inadequacies.<sup>101</sup> Chan investigated the associations between nursing student satisfaction and the clinical setting placement.<sup>19</sup> The Clinical Learning Environment Inventory (CLEI) was used to collect data from a sample of 108 second-year nursing students undertaking clinical placements in fourteen metropolitan hospitals in Southern

Australia.<sup>19</sup> The findings from the study suggested that student satisfaction was significantly higher in the students who were placed in settings that were highly task oriented ( $r = 0.62$ ,  $\beta = 0.37$ ).<sup>19</sup> However, the data were limited to student perceptions only.

Another study of 127 athletic trainers from twenty-five Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredited programs examined how undergraduate athletic training student's time is utilized during clinical field experiences. It also determined the effects of clinical field-experience length and setting, academic standing, gender, clinical assignment, and National Collegiate Athletic Association level on active learning.<sup>104</sup> Subjects completed a 1-day, self-reported observation of how their clinical field-experience time was utilized based on the type of setting. Time was divided into categories, 1) instructional time, 2) clinical time, 3) managerial time, 4) unengaged time, and 5) waiting time.<sup>104</sup> Both instructional time and clinical time were referred to as Active Learning Time (ALT). During ALT, students engaged in academic and clinical curricula consistent with their ability levels, while at the same time having sufficient time to learn, perform, and master clinical skills and competencies.<sup>104</sup> Clinical setting type was divided into 3 categories. 1) Upper Extremity Assignments (Baseball, Lacrosse, Softball, Swimming, Tennis, Volleyball), 2) Lower Extremity Assignments (Basketball, Field hockey, Soccer, Track), and 3) Mixed Extremity Assignments (Cheerleading, Football, Athletic training room, Gymnastics).<sup>104</sup>

The results of an ANOVA showed clinical assignment with respect to perceived percentage of ALT ( $F_{2, 171} = 6.40, P < 0.05$ ).<sup>104</sup> Subjects working with mixed extremity sport populations spent a significantly larger percentage of time in active learning ( $56.64 \pm 20.17$  minutes) than subjects working with upper extremity sport populations ( $45.76 \pm 16.73$  minutes).<sup>104</sup> A significant main effect for clinical assignment was percentage of waiting time ( $F_{2, 171} = 8.57, P \leq 0.05$ ).<sup>104</sup> Waiting times were defined as the amount of time spent attentively observing athletic practices for potential injuries or environmental hazards where one may have to perform an athletic training skill or behavior. Subjects working with mixed extremity sport populations perceived spending a significantly smaller percentage of time ( $16.54 \pm 16.63$  minutes) waiting compared with subjects working with upper extremity sport populations ( $28.59 \pm 18.61$  minutes) attributed to upper extremity sports being in season, requiring more students to be assigned to one instructor.<sup>104</sup>

This study suggested that documenting students' use of time may allow educators to identify clinical field-experience settings that maximize active learning time, expose students to their own unique learning situations, and offer students access to clinical field-experience settings aligned with their professional goals. Although this study supports a relationship between setting type and student learning, it is limited to students' perceptions of time spent during a single clinical field day where students' motivation and engagement may be a factor. Also, because all athletic trainer programs, like PT programs, vary in their academic preparation and clinical education design, single, direct

observational studies can only be generalized to specific programs.<sup>105</sup> Therefore, further research is needed.

### **ANNUAL ACCREDITATION REPORT (AAR)**

The AAR is a mandatory self-report that is currently submitted by PT academic program chairs annually through the CAPTE accreditation portal by PT education programs. It consists of information pertaining to program length, curricular model and courses, finances, space allocation, clinical education, number of admissions and demographics, and faculty characteristics.<sup>106</sup> These data are used to monitor compliance with the Evaluative Criteria (graduation rates, employment rates, number of faculty, and faculty vacancies etc.).<sup>106</sup> It is also used to develop descriptive reports about the state of PT educational programs. This study used these reports for 2013 as a source of information for program length and faculty scholarly productivity. In this study, these data were compared for similarities and differences amongst CAPTE accredited PT programs.

### **THE NATIONAL PHYSICAL THERAPY EXAMINATION (NPTE)**

After successfully completing a PT education program, graduates must take and pass the standardized (consisting of multiple choice questions) NPTE with a minimal score of 600 (on a scale of 200-800) to obtain a license to practice.<sup>2,23</sup> By knowing which characteristics or variables adequately predict

NPTE success, PT programs may make the necessary changes in student preparation that will foster first time success on this exam.

The NPTE (consisting of multiple choice questions) was developed and consistently refined by the FSBPT by sampling PTs opinions/analysis of practice parameters that ensures safe and effective practice of an entry level PT or PTA. The initial information-gathering step defines a list of work activity, knowledge, and skill requirements that reflects current entry-level practice. Secondly, subject matter experts develop surveys of the importance of work activities performed by PT, PTAs and the knowledge /skills required to perform them. Third, the survey is pilot tested and results are used for survey refinement. Fourth, the survey is distributed on a larger scale to a random sample of PT/PTAs. Fifth, data cleaning with the omissions of respondents secondary to missing data, experience level, and employment status. Finally, statistical analysis is performed and supporting expert groups conduct final review to ensure the results are consistent with current profession trends.<sup>107</sup>

### **Reliability**

During the 2009 NPTE administration cycle, internal consistency of licensure examinations were measured using the Kuder-Richardson Formula 20 for dichotomous choices and the Split-half reliability test using Spearman-Brown corrections to measure the consistency of two halves of the test.<sup>108,109</sup> All internal consistency estimates based on data from criterion candidates were greater than 0.80 for the NPTE test forms.<sup>108,109</sup> When considering all candidates, coefficients

for all NPTE forms were above 0.90.<sup>108,109</sup> These scores suggested that the NPTE forms are precise measures of entry-level knowledge in the field of physical therapy.

### **Validity**

The FSBPT established a validity framework used to organize existing sources of evidence supporting the use of NPTE scores for licensure decisions.<sup>108,109</sup> The framework involved gathering multiple sources of data to serve as evidence that connects all aspects of the tests development.<sup>109</sup> The sources of evidence collected by the Federation included a) test content, b) response processes, c) internal structure, and d) relations to other structures.

<sup>108,109</sup>

### **SUMMARY**

There is available literature that details the historical timeline of advancements in healthcare and healthcare education practices and performance standards since 1914.<sup>37-46,51-53</sup> The literature explains how PT professional education programs have evolved to keep pace with the demands of the profession and the quality expectations of CAPTE and agrees that the NPTE outcome is the most important measure of program quality. However, the literature does not provide a reliable predictive model for success or any indication of the changes that PT programs are currently making in terms of program and faculty characteristics (faculty scholarship, program length or

teacher effectiveness) to ensure that students are being properly prepared for a doctoring profession based on current practice requirements.

It is evident that there was a lack of prior research to support a relationship between PT faculty attributes and program characteristics and NPTE success. Several studies were found in the nursing, pharmacy, athletic training and dentistry educational literature which all indicated that relationships exist between faculty and program variables and licensure exam success. These studies showed evidence that predictability is present and important and thus additional research in PT would be beneficial. Of the topics researched, it was determined that faculty scholarship, program length and teacher effectiveness would be the characteristics of choice because of the expressed importance but lack of research to support their impact on student outcomes.

This study examined whether a significant relationship exists between the PT program faculty behaviors and NPTE scores as well exploring if differences exist between school outcomes based on the sum of PT program faculty scholarship activity and total program length. The results of this study may be used by PT programs to identify specific faculty/program variables that have a direct link a student's success on the NPTE. This may help to guide lower achieving PT programs in making pertinent changes to prepare students for passing the NPTE on the first attempt. Also, higher success rates can increase a programs' reputation for the quality of the preparation of skilled student physical



therapists. Lastly, findings from this study may allow CAPTE to continue to effectively determine a program's quality.

## **CHAPTER 3: METHODOLOGY**

### **INTRODUCTION**

Quantitative methods were used to explore the program attributes and faculty behaviors involved in achieving the student NPTE outcomes. This study involved a three-stage process using both prospective and retrospective research designs to identify the program attributes and faculty behaviors that are consistent with the following related research questions:

1. What is the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their classroom based upon their associated school rank (High vs. Low) per self-generated survey)?
2. What are the differences that exist between the total sum of PT-related scholarly activity (per Annual Accreditation Report (AAR) data) performed by PT educational program faculty with high vs. low passing NPTE rates between 2011-2013?
3. Does the total PT program length (in weeks) of the professional component (didactic and clinical) per AAR data differ when comparing programs with high vs. low passing rates on the NPTE?

This chapter describes the subjects, procedures and instrumentation used to determine whether or not these relationships exist. The self-generated survey instrument used in the study was entitled “Faculty Characteristics in

Physical Therapy Education Programs Survey”. The process for determining the internal consistency and validity of this survey instrument will also be described.

## **SUBJECTS**

### **Sample selection/inclusion criteria**

After providing proof of IRB approval and specifying the intended use of all study data, no additional permissions were required from PT programs, FSBPT or CAPTE concerning the use of collected data. The sample for stage 1 included the entire population (n=212) of 2013 CAPTE accredited PT educational programs in the United States and Puerto Rico. The sample size was a direct function of the response rate and AAR data availability. Therefore, by selecting from PT programs in all regions of the U.S., the power of the study was increased yielding a better representation of the entire population.

Program chairs/directors were sought as an expert panel for Stage 1 participation because of their direct role in overseeing and providing leadership/administrative responsibilities in the physical therapy department such as teaching, scholarly activities and service. Two rounds of surveys were sent out to develop consensus regarding the key attributes of scholarship, teaching and service.

The sample for Stages 2 and 3 (n = 112) included PT programs that met the inclusion criteria of rating highest (100.00%) (n= 80) or lowest (95.00% and

below) (n= 32) on the NPTE 3YUPR. Also, data collection was dependent upon full completion and return of data forms and surveys.

### **Exclusion criteria**

Programs that rated between 96% and 99% on the NPTE 3YUPR; did not receive CAPTE accreditation during 2013 or those that did not submit updated program data for CAPTE AAR reports for 2013 were excluded (n=100) from this study.

### **PROCEDURES**

To protect the rights and welfare of the research subjects, permission from the NSU Institutional Review Board (IRB) was requested on March 10, 2014. An approval letter was obtained on June 4, 2014 prior to the study along with exemption from further review. This research study was conducted in three stages that will be elaborated upon in the sections below: a) Stage 1– development of the Faculty Behaviors in Physical Therapy Education Programs Survey for use in Stage 2, b) Stage 2 – examined faculty behaviors of PT programs with high versus low 3YUPR, c) Stage 3– explored the differences between faculty scholarly activity and PT program length at PT program with high and low 3YUPR.

#### **Stage 1- Development of the self-generated faculty behaviors survey**

Because there were no surveys previously developed to address faculty behaviors in PT programs, a self-generated Faculty Behaviors in Physical

Therapy Education Programs Survey was developed. The survey sought to determine faculty traits related to the scholarship, service and teaching domains for the ensuing determination of salient faculty behaviors that may contribute to high performing PT educational programs. In developing the survey, a review of the literature was conducted to find common practices and attributes found to be analogous with the effective performance of the faculty roles of scholarly activity, teaching and service, which were derived partly from the HERI faculty survey created at the University of California, Los Angeles. Survey constructs were also derived from published literature from CAPTE, Carnegie Foundation for the Advancement of Teaching, Teachers College Press, The Council of Higher Education, The Association for Supervision and Curriculum Development, Physical Therapy Journal, Journal of Teacher Education, Journal of Allied Health and the Journal of Research in Science.<sup>3,28,40,42, 59-65,68,70-75,84,85,95</sup>

Based upon the results of the literature review, 28 major descriptors were revealed (7 for scholarship activity; 20 for teaching effectiveness; and 1 descriptor for service) (See Appendix 1) which were further divided into 32 varied constructs of interest for use as survey questions. A final 22 question faculty survey to determine the common behaviors of faculty in PT educational programs with high (3-YUPR average of 100) versus low (3-YUPR average of 95 or below) student NPTE outcomes was developed using the methods described in the paragraphs below.

*Statement classification of the self-generated faculty survey*

In the initial phase (round 1) of survey development, instead of taking a simple random sample of PT programs across the U.S., the 212 programs that met the inclusion criteria were classified into subgroups based on U.S. regions (Pacific, Northeast, Southeast, Midwest, Southwest and the Rocky mountains). Due to the sample size of this stage, a stratified random sample was taken to ensure that similar percentages of programs were selected from each region based on the total sum of PT programs within each region. Fifteen subjects (physical therapy program directors/chairs) were randomly selected, representing 7.08% of the population of PT programs in the U.S. and Puerto Rico, by region. A small sample, allowing for 25% margin of error, was considered appropriate during this exploratory stage of survey development.<sup>110-113</sup> Round 1 was implemented to satisfy the correct classification of individual constructs within the self-generated survey entitled, “Faculty Behaviors in Physical Therapy Education Programs Survey.”

#### *Data collection*

On September 1, 2014, the pilot survey was distributed online via the Survey Expressions website ([www.surveyexpressions.com](http://www.surveyexpressions.com)). (See Appendix 2) The introductory email provided subjects with the details of the study’s purpose, potential benefits and risks, the assurance of anonymity, and notification that the completion of the survey would serve as consent to participate.

The subjects were asked to sort each of the 32 survey statements into 3 domains that in their opinion had similar constructs. The survey statements

contained descriptors of quality teaching with each descriptor belonging to one of the three domains (teaching, scholarship, or service). If the subjects were unable to determine a categorical fit, they were asked to select N/A. To improve the response rate, reminder emails providing survey due dates were sent to all subjects who had not responded after 1 week resulting in a total of 14 completed surveys (93.3% response rate).

### *Data analysis*

Once data from the initial round of surveys were returned, the responses were loaded into the Statistical Package for the Social Sciences (SPSS). An Exploratory Factor Analysis (EFA) was performed for data reduction to eliminate variables that were unclear, redundant or unnecessary to ensure that there was an underlying relationship between the remaining variables and the constructs being measured. An EFA statistically groups numerous variables based on correlations between them. Although there was a preset assumption of which survey items belonged to each construct (teaching, scholarship, service), an EFA was conducted in an attempt to identify outlier variables that were unnecessary. It was also used to reproduce a distinction between teaching, scholarship and service by appropriately grouping variables into their expected category. The pilot self-generated survey consisted of 32 items, each of which was intended to represent only one of three factors (teaching, scholarship, or service activities).

Because teaching, scholarship and service are 3 different factors intended in this study to represent three different faculty traits, they were assumed to be

unrelated. With this assumption in mind, the rotation method of choice was varimax. While the total amount of variation is the same with rotated versus unrotated factor analysis, the individual factor contributions are not. The varimax rotational method makes large loadings larger (further from zero) and small loading smaller (closer to zero) allowing for an easier interpretation of factor loading. The rotated component matrix was reviewed to determine how many factors best explained the observed co-variation matrix within the data set. The eigenvalues  $> 1$  (i.e. higher than average) were used. Initially, the factorability of the 32 items that described the constructs teaching, scholarship and service were examined using SPSS default Kaiser Criteria to determine which factors to retain. The SPSS default is criterion 1, meaning that all factors with eigenvalues greater than 1 were retained.

Secondary analysis with Cattell's Scree Test was performed to determine the significance of the factors. By plotting the eigenvalues against the corresponding factors, this allowed the visualization of the maximum number of factors to extract. Because the analysis revealed that 12 different categories explained the co-variation and the original interest was to create a survey tool with questions that differentiated between only 3 categories of faculty behaviors (teaching, scholarship and service) this analysis was repeated specifying that only 3 factors be extracted.

The use of descriptive statistics via frequency tables were used to determine if the statement groupings selected by subjects were the same as or



close to the intended and expected groupings of the study.<sup>114,115</sup> Statements that were inconsistently grouped with more than one construct (i.e. statement “combining learning goals with community service” were grouped by 55% of subjects as a teaching construct and 45% as a service construct) and/or assigned to the “N/A” group were either removed or the wording changed for the second round for better clarity.

Based upon the results of round 1, the survey was revised by removing 3 inconsistently grouped statements, 1) Faculty/professors that are consistently approachable, 2) Improvement of your expertise in the course subject you teach, and 3) Relevant level of professional expertise for the course you teach. Also, the statement “Engaging students in tasks to enhance learning outcomes as well as community needs” was reworded to “Do you engage students in tasks to enhance community needs”; removing mention of learning outcomes to focus on the service aspect of the statement. This was justified due to student outcomes being addressed within other survey statements specific to the teaching domain.

### **Round 2 Survey Statement Classification**

On October 14, 2014, the revised survey was administered to 50 PT program chairs/directors via the Survey Expressions website using stratified sampling via blind selection from the same regional subgroups classified for round 1 of the survey (a combination of some subjects from phase 1 plus new subjects), representing 23.58% of the population of PT programs in the U.S. and Puerto Rico. Based on the total population, 50 subjects was considered

appropriate at this stage of the study.<sup>110-113</sup> To improve the response rate, reminder emails providing survey due dates were sent to all subjects who had not responded after 1 week. The final survey responses were received on December 14, 2014.

### *Data analysis*

The data were analyzed on December 14, 2014 using descriptive statistics (frequency tables) as previously described. The process whereby inconsistent responses were removed from the survey to improve its internal consistency follows below.

### *Internal Consistency of the Self-generated Faculty Survey*

The internal consistency of the second round survey instrument (all subscales combined) and on each individual subscale were assessed through use of Cronbach's alpha. Cronbach's alpha measures internal consistency to determine how similar a series of items are as a group. It is used as a measure valued between 0 and 1 with measurements around 0.7 being regarded as acceptable.<sup>116</sup> Values were reviewed to determine how well each survey item complemented each other in their measurement of the specified aspects of the constructs being measured (i.e. teaching, scholarship, and service), and how closely related the items were as a group. Cronbach's alpha analyses were repeated following the removal of 7 survey statements that scored low in their response frequency (below 75%) when compared to the intended classification of

the construct (teaching, scholarship, service). This resulted in a final 22-question survey. See Appendix 3.

### **Stage 2- Examining faculty behaviors of PT programs with high versus low NPTE 3YUPR**

Stage 2 answered the following research question:

Question 1- What is the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their classroom based upon their associated school rank (High vs. Low) per self-generated survey)?

The above question was addressed using the following data collection steps:

- a) The FSBPT website was assessed on September 26, 2014 for the latest (2011 to 2013) NPTE 3-YUPR by PT school. PT programs with the average of 100.00 (n = 80) were marked high for use in the study. PT programs with scores of 95.00 and below (n = 32) were marked low for use in the study. Programs with scores ranging from 96 to 99 (n = 100) were excluded. A total of 112 programs met the inclusion criteria.
- b) A master list of accredited PT programs with their associated directors/chairs was obtained from the CAPTE website. The final 22-question survey from stage 1 was distributed by email on March 21, 2015 to all (n=112) current directors/chairs of the 112 selected PT education

programs via a web-based format using survey software from Survey Expressions. (See Survey Appendix 3)

- c) The chair/directors were instructed to complete the survey if they had teaching responsibilities within the PT program. If they had no teaching responsibilities during the 2013 school term, they were instructed to distribute the survey to a faculty member who did. Survey collection was completed on April 19, 2015.

### **Stage 2 statistical analysis method**

All data from the 72 returned questionnaires, (72/112; a 64% return rate), were reviewed through the use of a) descriptive statistics to describe the distribution and range of responsiveness for each survey question and to examine data for skewness and b) bivariate analysis using cross tabulations and chi-square analysis to identify trends and to examine the possible associations between one survey question and another. Cross tabulations allowed for the comparison of relationships between high versus low 3 YUPR and individual survey questions that represented a faculty behavior. Skewness was used to measure the symmetry/lack of symmetry of data distribution. When the ratio of skewness divided by the standard error was larger than 1.96, the value for skewness was considered statistically significant at  $p < 0.5$  (Zed distribution).<sup>117</sup>

### **Stage 3- Exploring the differences for total faculty scholarly activity and PT program length between program 3 YUPR**

Stage 3 addressed the following research questions:

Question 2- What are the differences that exist between the total sum of PT-related scholarly activity (per Annual Accreditation Report (AAR) data) performed by PT educational program faculty with high vs. low passing NPTE rates between 2011-2013?

Question 3- Does the total PT program length (in weeks) of the professional component (didactic and clinical) per AAR data differ when comparing programs with high vs. low passing rates on the NPTE?

The above questions were addressed using the following data collection steps:

- a) Student first time pass rates for the 2013 NPTE were requested from the Federation of States Boards of Physical Therapy on September 10, 2014 in letter form accompanied by the FSBPT data collection form and an instruction sheet. (See Appendixes 4-6) Data for the 112 PT programs that met the inclusion criteria were entered into the SPSS database for analysis.
- b) Data on faculty scholarship and program length via AAR data were requested from CAPTE on September 10, 2014 (See Appendix 7). CAPTE responded, requesting a collection method that provided additional proof of program anonymity before AAR data would be released. Therefore, in order to link AAR data with NPTE pass rates, programs were classified as being in a high or low rated category. This was done by identifying programs with 3 YUPR of

100 with the letter “H” and those scoring 95 or below with the letter “L”. A second request was sent on October 3, 2014 with PT program names and their assigned NPTE pass rate letter (H or L) provided on a Data Completion Supplemental Form accompanied by an instruction sheet. (See Appendix 8). The supplemental form was discarded by CAPTE and replaced by a CAPTE generated data collection form. CAPTE procedurally removed the program specific scores for 3YUPR to maintain the anonymity of the programs with unique scores. Annual Accreditation Report 2013 program data was received on February 20, 2015.

### **Stage 3 statistical analysis method**

Independent samples t-tests were performed to determine the magnitude of the difference between high and low scoring programs (NPTE 3 YUPR) based on the group means of scholarly activity performed and program length (the total sum of PT related scholarly activity performed by each PT educational program in 2013 and the total length in weeks of the professional component (didactic and clinical) of PT programs).

## **CHAPTER 4: RESULTS**

### **INTRODUCTION**

This chapter presents the results of this study captured by the self-generated faculty survey as they relate to the research questions. It focuses upon the relationships between PT program characteristics (program length and scholarly activity), faculty behaviors related to scholarship, teaching, service, and 3YUPR on the physical therapy NPTE.

#### **Stage 1 survey factor analysis**

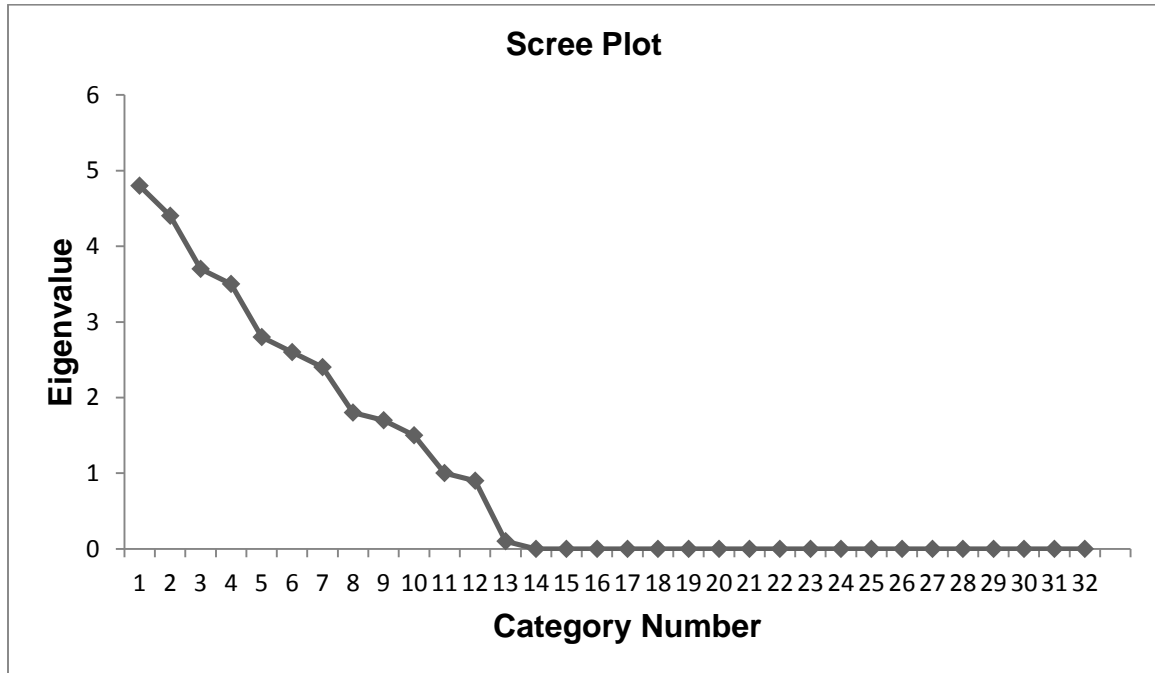
Question 1- What is the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their classroom based of their associated school rank (High vs. Low) per self-generated survey)?

The initial Exploratory Factor Analysis (EFA) of the pilot survey was used to examine the factorability of the 32 faculty survey items. Review of the scree plot indicated that the 32 survey items were categorized by twelve influencing factors, each representing between five and twelve percent of the variance of the correlation with a cumulative variance of 96%. (See Figure 1)

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Figure 1

Faculty Perceptions of scholarship, teaching and service



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Descriptive statistics showed that eight of the twelve EFA established categories only contained two or less survey items. With a limited number of items representing and defining each category, no essential categorizing themes could be forged that were consistent with any of the three points of interest (teaching, scholarship, service).

Also, a total of six survey items, 1) performing research in the subject area in which you teach, 2) having high expectations for students, 3) comparison and review of commonly used instructional formats, 4) teaching approach that is



guided by practical knowledge, 5) perception of common misconceptions/difficulties that students encounter, and 6) familiarity with the outline of skills students are expected to learn in your course) did not load higher than 0.3 (correlation between observed survey items and categories).

The second EFA (forced three factor extraction) separated the 32 survey items into three separate categories that explained 14%, 13%, and 13% of the variance of the correlation with a cumulative variance of 40%. Similar to the first EFA, no essential categorization/themes could be forged that were consistent with any of the three points of interest of this study (teaching, scholarship, service). Therefore, this EFA was not considered further by the researcher.

### **Round 1 survey response descriptive statistics**

Fourteen of 15 surveys were completed and returned (93.3% response rate). The respondents agreed 93% of the time with the following 10 survey items: 1) teaching approach that is guided by practical knowledge, 2) familiarity with the outline of skills students are expected to learn in your course, 3) understanding how your course fits in aggregate to other courses in the curriculum, 4) performing research in the subject area in which you teach, 5) participation in opportunities to share research ideas and participate with fellow faculty, 6) perception of common misconceptions/difficulties that students encounter, 7) having a true interest in the subject you teach, 8) having high expectations for students, 9) reflection and analysis of teaching methods, and 10) researching activities that promote professional development).

They also agreed 86% of the time with the following 12 items: 1) guidance of students through methods that promote knowledge recall, 2) establishing a research agenda, 3) having an alternative teaching approach if students are not learning, 4) having a clear understanding of how to structure and present subject matter, 5) awareness of effective instructional strategies that address student learning needs, 6) familiarity with pre-requisite knowledge expected prior to the course you teach, 7) receiving teacher training prior to teaching, 8) attending workshops for teacher preparation, 9) comparison and review of commonly used instruction formats, 10) studying how to convert principles of instruction into learning activities, 11) providing students with adequate faculty availability, 12) and exploration of instructional environments that maximize student learning).

Respondents agreed 79% with 2 items (guidance of a research mentor and combining learning goals with community service). One item (applying course content with community based activities) had 71% agreement. Three items (researching the literature to reflect on accuracy of material taught, engaging students in tasks to enhance learning outcomes as well as community needs, and reviewing various means that promote student understanding) at 50%. Two items (improvement of your expertise in the course subject you teach, and relevant level of professional expertise for the course you teach) at 43%. Only 1 item (critique of methods that promote student application of taught material) at 21% and 1 item serving as a control (faculty/professors that are consistently approachable) to which the subject responses were evenly distributed across all classification choices. Items with a percentage below 75%

were considered low. Because 78% of all of the items tested were classified above 75%, the results supported discriminant validity traits in the faculty survey after a change in wording of 1 variable (Engaging students in tasks to enhance learning outcomes as well as community needs) and the removal of the 3 inconsistent variables (improvement of your expertise in the course subject you teach, relevant level of professional expertise for the course you teach, and reviewing various means that promote student understanding). This resulted in a 29 question survey extracted from the original 32 questions. See Appendix 10 for low classification items.

### **Round 2 Survey Response Descriptive Statistics**

Thirty one of 50 surveys were completed and returned (62% response rate). The respondents agreed 76% of the time with all survey items, with the exception of seven. Five of the 7 items had lower respondent agreement percentages in comparison to round 1 of the survey as follows: 1) reflection and analysis of teaching methods decreased from 93% to 73%, 2) exploration of instructional environments that maximize student learning decreased from 86% to 71%, 3) researching activities that promote professional development decreased from 93% to 48%, 4) combining learning goals with community service decreased from 79% to 45%, and , 5) applying course content with community based activities decreased from 71% to 35%. One survey item (researching the literature to reflect on accuracy of material taught) had a increased respondent agreement percentage from 50% to 68% but remained

below 75%. Similar to round1, the responses were evenly distributed across all classification choices for the control item (faculty/professors that are consistently approachable).

### **Internal consistency of the self-generated faculty survey: Faculty behaviors in PT educational programs**

The value of Cronbach's alpha was  $\alpha = 0.661$  for the remaining 29 survey items of round 2 of the survey; 0.67 for the combined teaching items only (N=19);  $\alpha = 0.074$  for the combined scholarship items only (N=7); and  $\alpha = 0.562$  for the combined service items only (N=3). The values indicated a level of error variance too high for all items to be considered reliable. All survey items, particularly the teaching items, were not found to be closely related to each other. A reliability coefficient of .70 or better was considered acceptable.

Cronbach's alpha was repeated with the 7 survey items removed that tested below 75% on the frequency classification. The resulting value of Cronbach's alpha was  $\alpha = 0.701$  for all items of the survey (N=22) indicating sufficient internal consistency within survey items as a whole. Due to the improvement in Cronbach  $\alpha$  scores, the 7 survey items were permanently discarded, yielding the final 22-question survey.

### **Faculty behaviors in high vs. low NPTE pass rate programs**

Question 1- What's the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their

classroom based upon their associated program rank (High vs. Low) per self-generated survey)?

### *Descriptive Statistics*

Of 112 surveys sent to 112 PT programs that met the inclusion criteria of highest (100%) and lowest (95% and below) 3 YUPR, 72 were completed and returned with no missing data, representing a 64.3% return rate. The surveys were completed by 73.6% chairs/directors (N=53), 8.3% professors (N=6), 9.7% assistant professors (N=7), 5.6% associate professors (N=4), 1.4% instructors (N=1), 1.4% other (chair, program director and associate professor combined) (N=1). The 3YUPR of the programs ranged from scores of 50% to 100% with a mean of 95.44%, median of 100%, standard deviation of 8.361 and a range of 50. To maintain anonymity of school data, high and low categories were used instead of individual scores. Of the 72 completed surveys 46 were from programs in the high rated category and 26 from PT programs in the low rated category. No duplicate responses were received from any school.

### *Skewness*

Eighteen of the 22 survey questions were statistically significant ( $p < 0.5$ ) with values ranging from 0.591 to 3.964. Three questions (Do you understand how your course fits in aggregate to other courses in the curriculum; Do you have a true interest in the subject you teach; Do you provide students with adequate faculty availability) had no significant skewness because every participant

provided the same affirmative answer. This indicated that faculty from both high and low rated programs (3YUPR) shared these characteristics of teaching. The next step was determining the likelihood of faculty to actually use these techniques in their classroom based on their program ratings (high versus low rated 3YUPR).

#### *Cross tabulations/Chi-Square*

Overall, cross tabulation comparisons of faculty indicate that faculty at PT programs with high 3YUPR tested significantly more likely to perform 18 of the 22 effective behaviors of the survey consistent with the effective teachers compared to teachers at programs with low pass rates. When examining each survey category separately, the majority of survey questions belonged to the teaching domain (n=18). Chi-square values indicated that there was a statistically significant association between program rank and faculty participation in the 18 quality teaching traits. However, the percentage difference between high (97.8% - 100%) and low (84.6%) rated programs were minimal for 6 of the 18 characteristics (having a teaching approach guided by practical knowledge, having a clear understanding of how to structure and present subject matter, perceptive of common misconceptions/difficulties that students encounter, familiarity with the outline of skills students are expected to learn in their course, and familiarity with pre-requisite knowledge expected prior to the course they teach). Table 1 shows the key faculty teaching behaviors that separated low 3YUPR performing programs from high 3YUPR performers.

Teachers in both high and low performing programs had high expectations for students ( $p=0.096$ ). All participants from both high and low scoring PT programs reported that faculty were available to students, had a true interest in the subject they taught, and understood how their course fit in aggregate to other courses in the curriculum.

Table 1

Faculty Teaching Behaviors in PT Programs with High versus Low 3YUPR

Faculty Behavior	LOW 3YUPR %	HIGH 3YUPR %	p-value	X <sup>2</sup>
1. Guide students through methods to promote knowledge recall	42.3%	100%	* $<0.001$	33.52
2. Compare and review commonly used instructional formats in classroom	57.7%	89.1%	*0.002	9.50
3. Critique methods that promote student application of taught material	61.5%	100%	* $<0.001$	20.54
4. Study how to convert principles of instruction into learning activities	42.3%	100%	* $<0.001$	33.52
5. Explore instructional environments that maximize student learning	76.9%	97.8%	*0.004	8.27
6. Awareness of effective instructional strategies that address student learning needs	65.4%	97.8%	* $<0.001$	14.61
7. Received teacher training prior to teaching	42.3%	76.1%	*0.004	8.12
8. Attend workshops for teacher preparation	53.8%	100%	* $<0.001$	25.47

Faculty Behavior	LOW 3YUPR %	HIGH 3YUPR %	p-value	X <sup>2</sup>
9. Have an alternative approach if students are not learning	50%	97.8%	*<0.001	24.25

\*Significance level < 0.05

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There were three survey questions representing faculty scholarship behaviors, all of which separated high vs. low performing programs. They were 1) Participating in opportunities to share research ideas and practice with fellow faculty (53.8% low versus 87.0% high rated programs,  $\chi^2(1)=9.712$ ,  $p=0.002$ ), 2) Performing research in the subject area in which they teach (30.8% low versus 97.8% high,  $\chi^2(1)=38.45$ ,  $p<0.001$ ), and 3) Establishing a research agenda (53.8% low versus 84.8% high,  $\chi^2(1)=8.18$ ,  $p=0.004$ ). Only one survey question represented the domain of service (Engage students in tasks to enhance community needs), which separated high (91.3%) vs low (30.8%) performing programs ( $\chi^2(1)=26.69$ ,  $p<0.001$ ).

### **NPTE pass rates vs. scholarly activity and program length**

Question 2 – What are the differences that exist between the total sum of PT-related scholarly activity (per Annual Accreditation Report (AAR) data) performed by PT educational program faculty with high vs. low passing NPTE rates between 2011-2013?

#### *Independent T-Test*

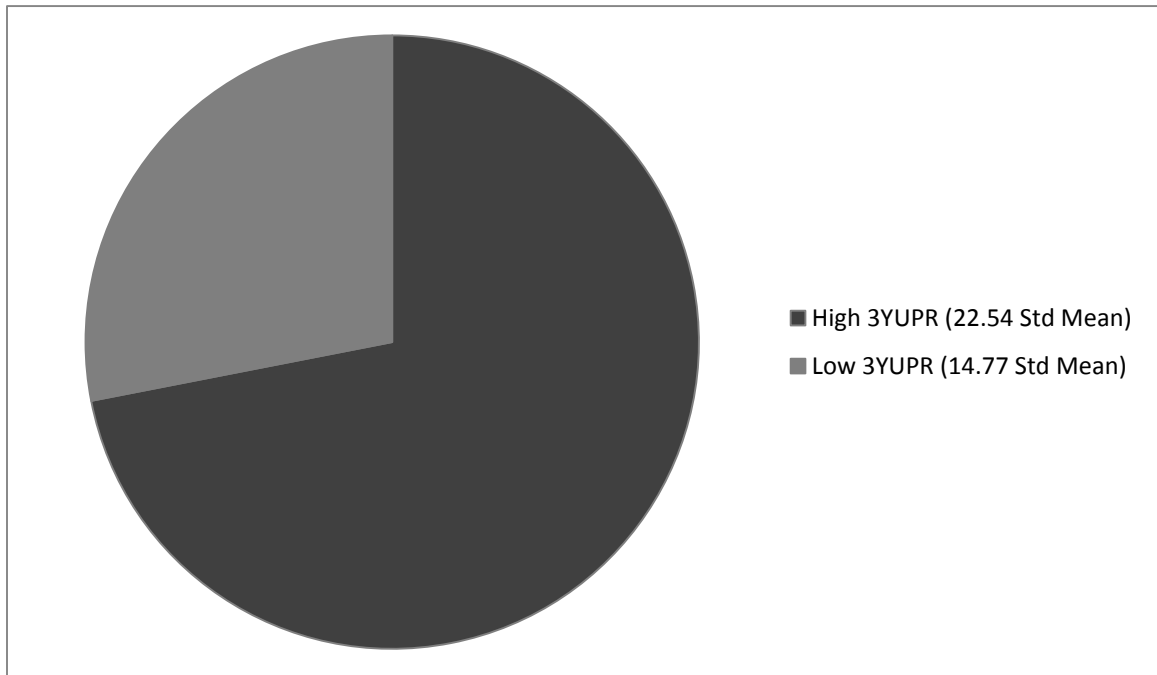


Higher ranked PT programs (NPTE 3 YUPR) had statistically significant higher participation in scholarly activity ( $22.54 \pm 11.63$ ) in 2013 compared to low ranked programs ( $14.77 \pm 8.47$ ),  $t(70) = 2.99$ ,  $p = 0.004$ . With a sig (2-tailed) value less than 0.05, the group means of scholarly activity (sum of all ranged from 1 to 67) was found to be statistically significantly different (not likely due to chance). (See Figure 2)

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Figure 2

Total Scholarly Activity and PT Program NPTE 3YUPR Outcomes



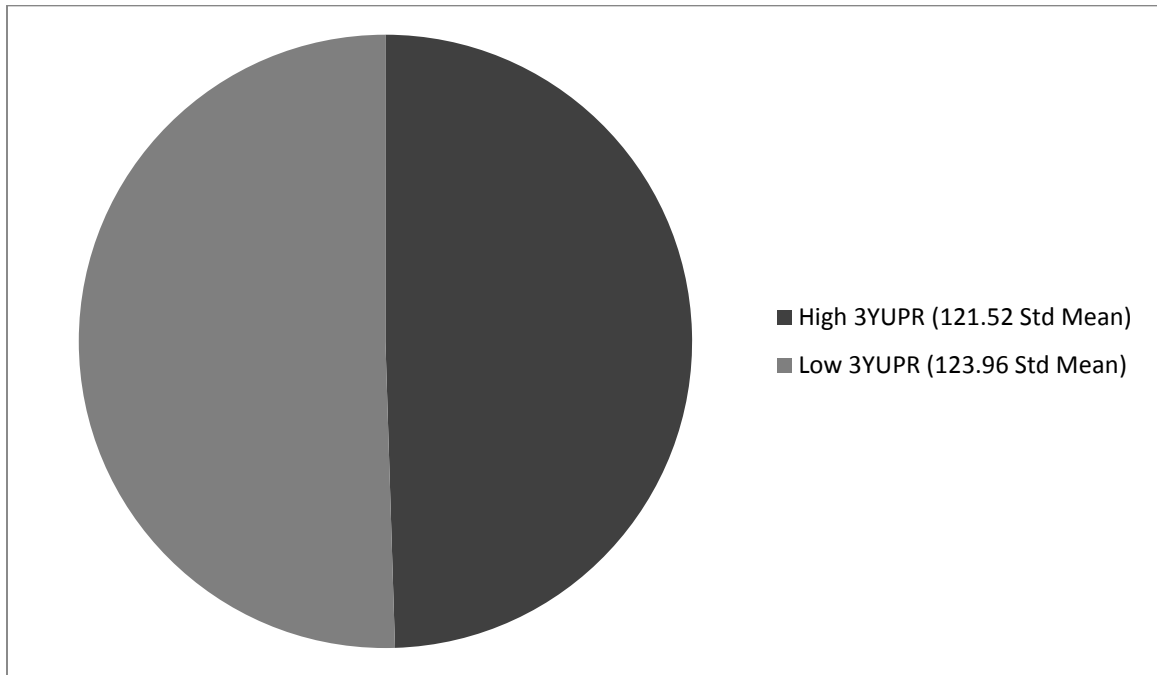
Question 3 – Does the total PT program length (in weeks) of the professional component (didactic and clinical) per AAR data differ when comparing programs with high vs. low passing rates on the NPTE?

No statistically significant difference was found between PT program lengths in higher ranked programs ( $121.52 \pm 12.16$ ) in 2013 compared to low ranked programs ( $123.96 \pm 18.80$ ),  $t(37) = -0.595$ ,  $p = 0.555$ . With a sig (2-tailed) value greater than 0.05, the differences in group means of program length (total length in weeks ranged from 92 to 180) are likely due to chance. (See Figure 3)

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Figure 3

Total Program Length and PT Program NPTE 3YUPR Outcomes



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## SUMMARY

In chapter 4, the validity and internal consistency of the Faculty Behaviors in Physical Therapy Education Programs Survey were demonstrated through descriptive statistics and Cronbach's alpha coefficients. The likelihood of faculty possessing the stated characteristics of teaching, scholarship and service

behaviors based on their program's rating was described by using cross tabulations and chi-square statistics. The differences between PT program rates (NPTE 3YUPR) and program variables via Independent t-tests was reported.

## **CHAPTER 5: CONCLUSION**

### **INTRODUCTION**

Chapter 5 provides the implications of the results, conclusions, limitations, delimitations and recommendations for further research. Conclusions are presented to address whether or not the data were able to provide relevant answers to the research questions. Discussions of findings and how they relate to the purpose of this study are reviewed along with recommendations for further research.

### **SUMMARY OF THE IMPLICATIONS OF THE RESULTS**

This study sought to better understand how program attributes and faculty behaviors in PT educational programs impact student outcomes on the NPTE. A literature review revealed faculty traits and program attributes analogous to effective teaching and overall program quality which were used as the basis for the development of the self-generated survey used in this study. This study also sought to further explore how faculty and program traits differed based upon high and low NPTE 3YUPR scores. A general review of the research questions, sample population, survey instrument, data collection and analysis, limitations, delimitations and methodical approach is provided.

The literature did not provide a reliable predictive model for NPTE success. Nor did it provide any indication of the standardization of program and faculty traits or teacher effectiveness metrics to ensure that students are being

properly prepared for a doctoring profession based upon current entry-level practice requirements. There was also no requirement for consistency with the FSBPT analysis of practice which maintains a current listing of knowledge indicators that are important for the successful performance of entry-level tasks. This led to research question 1.

### **Faculty behaviors in Physical Therapy education programs**

Question 1: What is the likelihood of PT program faculty utilizing effective teaching behaviors (as it relates to teaching, scholarship and service) in their classroom based upon their associated school rank (High vs. Low) per self-generated survey)?

The HERI faculty survey created at the University of California, Los Angeles (UCLA) assesses graduate programs for faculty effectiveness, service and scholarship.<sup>59</sup> This was the only survey instrument of its kind found during the review of the literature. However, only 3 items in this survey were appropriate to this research and were modified and used in this study. The remaining survey questions were beyond the scope of this study, and were not specific to PT education as they focused on the political views of faculty, sources of stress, and courses taught on ethnicity and gender. Therefore, a goal of this study was to develop a survey instrument to generate an answer to identify common faculty behaviors specific to PT education programs with high versus low student NPTE outcomes (research question 1).

No documented literature was found that provided details relative to the process in which the HERI survey was validated. Without the specifics of the HERI survey validation and lacking a previously developed tool for use within Physical Therapy education, this study proceeded with a multistep process of creating a valid survey tool which consisted of 1) defining survey constructs, 2) survey item development, 3) internal consistency measures, and 4) examination of relationships between data sets. These steps share similarities and differences to survey validation methods of other studies.<sup>125-128</sup>

Survey construct development within this study was based on specific faculty behaviors/traits analogous of effective teaching per an in-depth literature review while other studies accomplished this via focus groups consisting of experts with varying years of experience<sup>125</sup>; and through use of pre-established constructs from gold standard surveys within their fields of interest.<sup>126-128</sup> Considering the difficulty experienced within this study to collect an equal number of examples representative of each construct (teaching, scholarship, and service), it may have been beneficial to seek counsel from experts within the field of teaching who could share insight on important examples of effective teaching behaviors that were not transparent in a review of the literature alone.

Survey item development was completed using a series of 2 pilot surveys sent to physical therapy program faculty experts (chairs/directors) which allowed for revisions based on survey response choices only. This differs from other studies that performed only 1 pilot survey in combination with either a pre- or

post-pilot survey interview or listening session which allowed additional feedback concerning survey items that may not have been made evident with the sole use of response choices to pre-determined closed ended survey questions.<sup>125,126,128</sup>

The use of 2 pilot surveys proved beneficial in highlighting the need for statement changes. This was evident when the percentage of respondent agreement on various surveys statements decreased between the 1<sup>st</sup> and 2<sup>nd</sup> pilot survey which indicated that there were potential limitations in subject interpretation. This allowed for either wording changes or removal of statements in efforts to strengthen the overall survey. Also, conducting 2 pilot surveys did allow for an unbiased look at subject responses based only on survey questions of interest. By avoiding panel open ended discussions, it decreased the possibility of making changes based on personal judgements of those who may not be impartial to a specific survey item or lose direction and provide unnecessary information. However, it may be beneficial for future studies to explore open ended advice from panelists (considering years of teaching experience), while still taking into consideration the existing literature, focus on initial constructs of interest and data analysis.

While some researchers chose to perform no further testing after reviewing pilot survey results<sup>128</sup>, others as well as this study chose to further examine the developed survey via internal consistency measures using Cronbach alpha data.<sup>126,127</sup> Also, other studies have shown to conduct Exploratory Factor Analyses (EFA) to identify the internal structure of survey items.<sup>125,126</sup> EFA was also performed within this study. However, the results were



not considered due to difficulty forging any themes from the results. EFA would have been more appropriately used if no pre conceived categories were established and if there were a larger sample of constructs from the service and scholarship domains. This would allow for the EFA to reveal the structure of the variables. Because there was a pre-set idea of categories to base the factor analysis on, a Principal Component Analysis (PCA) would have been more appropriate. However, it was not performed due to lacking a normal distribution in data and needing a larger sample. Use of descriptive statistics proved to be a better choice.

Lastly, this study further validated the faculty survey's ability to determine the likelihood of faculty using effective traits via Cross tabulations and Chi-square analyses. Although this step was not found in referenced studies<sup>125-128</sup>, it was considered important in this study because it allowed examination of the relationship of faculty behaviors within the survey data that were not readily apparent when survey responses were analyzed as a whole. Also, with survey results showing 18 of the 22 listed effective behaviors being performed by faculty at high scoring programs, this validated the survey's ability to make the distinction between faculty at different scoring programs (high vs low). With the confidence that the survey could make this distinction, additional attention was placed on individual survey items per domain (teaching, scholarship and service).

Within the teaching domain, 14 of the 18 survey items were more likely to be performed by faculty at high scoring programs. These items include 1)

promoting knowledge recall, 2) comparing and reviewing commonly used instructional formats in the classroom, 3) critiquing methods that promote student application of taught material, 4) studying how to convert principles of instruction into learning activities, 5) exploring instructional environments that maximize student learning, 6) using a teaching approach that is guided by practical knowledge, 7) having a clear understanding of how to structure and present subject matter, 8) having a perception of common misconceptions/difficulties students encounter, 9) awareness of effective instructional strategies, 10) familiarity with skills students are expected to learn, 11) pre-requisite knowledge expected prior to course, 12) receiving teacher training prior to teaching, 13) attending teacher preparation workshops, 14) having high expectations of students and 15) having an alternative teaching approach when students aren't learning. These faculty behaviors are consistent with faculty preparation and continued self and student development which would be expected from effective faculty and associated with programs with high rated 3YUPR. This is similar to prior studies by Darling-Hammond, Rosenholtz, Berk, and Boyer<sup>63,64,71,84,85</sup>, which state that all faculty behaviors pertaining to teacher preparation, continued learning/professional development were more likely to be performed by faculty at high rated PT programs. It is important to examine pedagogical content knowledge (pedagogical and content knowledge combined) when determining teacher effectiveness. All of the 14 behaviors mentioned are valuable in that they are representative of the skills necessary with pedagogical knowledge. With pedagogical knowledge, faculty/teachers understand and utilize various

instructional methods that are comprehensive to all student learning types. They have clarity of the potential student learning difficulties based on their course's material and how to adapt their teaching methods accordingly, which should reflect in student outcomes. This is expected from teachers at higher scoring programs but future studies should link years of teaching experience with the surveys responses because pedagogical knowledge is expected to develop over time with teaching experience. It would be beneficial for future studies to examine teaching experience of faculty at low scoring programs to support its link to student outcomes. Also, classroom management, faculty motivation, job satisfaction and understanding differing base levels of achievement should be explored for faculty at lower scoring programs for the potential impacts on student learning.

In contrast, there were 3 survey items within the teaching domain that tested equally likely to be performed by both high and low scoring programs. These items include, 1) understanding how your course fits in aggregate to other courses in the curriculum, 2) providing adequate faculty availability, and 3) having a true interest in the subject taught. These faculty traits are expected from any faculty member despite their level of effectiveness with student outcomes or years of experience. These three behaviors are important but they do not require additional efforts (i.e. training, active critiquing of one's skills and engaging in activities for personal improvement for teaching effectiveness) from faculty and therefore, are not expected to have a measurable difference among faculty at either high or low scoring programs which is consistent with the results. This

supports the assumption that the survey is able to show similarities between faculty groups when present.

Within the scholarship domain, all 3 faculty behaviors, 1) participation in opportunities to share research ideas and practice with fellow faculty, 2) performing research in the subject area taught, and 3) establishing a research agenda, were more likely to be performed by faculty at high scoring programs. This supports the understanding that simply having content knowledge of a course may not be enough to effectively impact student learning and outcomes. Knowing every aspect of course subject matter is good, but students need the material to be taught effectively. Effective teachers demonstrate pedagogical content knowledge in which they are aware of different teaching strategies; partake in consistently utilizing these skills; reflecting on their actions and results, and collaborating with other faculty to share and continue learning how to be more effective through faculty scholarship. This is also consistent with the literature<sup>60-65</sup> that states that there is a difference between a qualified teacher who has a basic understanding of their course objectives and truly likes the course they teach and an effective teacher who is able to envision instructional goals and promote learning through use of pedagogical knowledge and ongoing professional development.

Lastly, the one item of the service domain (engaging students in tasks to enhance community needs) also proved to be more likely to be performed by faculty at high scoring programs. With only one survey item, it cannot be

assumed that the results can be generalized to the act of service overall, however, it can serve as an introduction to future research. Service is a means by which faculty can collaborate with each other, students and the community in different venues (i.e. conferences, community events, dissertation committees) to merge and/or share their teaching and scholarship experiences. Although, teaching, scholarship and service are 3 key roles of academic faculty, teaching and scholarship seem to take precedence to service. This may be due in part to service being unclear and vague by definition, or due to it not being set as a priority due to other teaching obligations. However, as faculty gain experience and gain more confidence with their teaching and research responsibilities, they may be more open to engaging in additional community tasks that would be beneficial to the community as well as themselves and in turn, their teaching effectiveness. As previously mentioned, it would be beneficial in future studies to also link years of faculty experience with their survey responses.

The above mentioned Cross-tabulation findings helped to visualize differences among faculty based on program 3YUPR. However during survey development, the majority of original survey questions representing service and scholarly activity were not representative of what faculty perceived as service and scholarly activity as they were incorrectly classified/grouped by faculty participants under the construct of teaching and were excluded. This exclusion resulted in fewer survey questions representative of scholarly activity and service. Due to the challenges of maintaining 3 separate domains (teaching, scholarly activity and service) when developing the survey, this resulted in an

instrument that best informed about the teaching and not necessarily the scholarship and service attributes of PT program faculty. This led me to believe that all survey constructs were more meaningful when combined rather than separately. This was also evident because faculty viewed the majority of constructs as belonging to the category of teaching, instead of making the distinction between teaching, scholarship or service, supporting the idea that scholarship and service are aspects of teaching and therefore should not be viewed independently.

This is supported by literature that states that the most understood role of faculty is that of teaching, with scholarship being somewhat understood by those in the academia and service having the least clarity.<sup>129-130</sup> Schnaubelt and Statham explored the perceptions of full time faculty at 4 year universities in Mississippi on the divisions of faculty roles. It was found that respondents believed that service is a form of scholarship, while mentioning that service expectations are unclear and difficult to evaluate. When examining individual remarks, a faculty member stated, “it is hard for me to separate these areas. It is hard for me to say that service is this, teaching is this, scholarly productivity is this”.<sup>130</sup> Schnaubelt and Statham noted that neither tenure status nor academic rank were significant factors in faculty perceptions in their study.

A historical review of teaching reveals that all faculty responsibilities were once all considered under the sole umbrella of teaching.<sup>131-133</sup> As time has evolved, the separation of faculty responsibilities were influenced due in part to

direct regulation, incentive programs, outside stakeholders (federal government, governing boards and professional organizations), as well as political and world events which have shifted increased attention to student achievement scores and school/faculty accountability. As a result, there have been increased changes requiring that teaching roles and strategies be more complex, specialized and expanding.<sup>133</sup> Although role separation may be a useful means of measuring faculty accountability, it's evident that teaching encompasses many roles. To further explore faculty accountability and how it could impact student outcomes, PT program guidelines were explored.

CAPTE guidelines require physical therapy core faculty members to actively engage in scholarly activities and have a scholarly agenda that supports their teaching.<sup>75</sup> Core faculty should demonstrate expertise through scholarship that includes peer-reviewed presentations and publications related to their area of teaching.<sup>42,28</sup> The faculty survey of this study did ask the subjects to select whether or not they performed research in the subject area in which they taught, with results showing that faculty from higher scoring programs being more likely to do so. Although this gave good insight on a broader scale, there is currently no specific quantity of scholarly activity that has been set to serve as a standard for compliance with CAPTE guidelines. Further exploration into determining the total sum within different divisions of scholarly activity (i.e. presentations, publications, etc.) is important in providing a starting point for creating this standard and is recommended for future survey studies. Although this link was not made for the individual faculty who completed the surveys, it was explored further in this study

by looking at total sums of faculty scholarly activity based on different PT programs (research question 2).

### **NPTE 3YUPR and faculty scholarly activity**

Question 2: What is the difference in the total sum of PT related scholarly activity (per AAR data) performed between high vs. low 3YUPR by each PT educational program in 2013?

When assessing school data for total scholarly activity, all PT programs met the requirement of engaging in some form of scholarly activity. However, high rated PT programs had significantly higher volumes of scholarly activity in comparison to low rated programs.

While prior studies failed to examine the exact sum of scholarly activity when exploring program differences, this study was able to utilize program specific quantities. An assumption of this study was that an increase in scholarly activity meant additional responsibilities of faculty that surpassed the general scope of classroom teaching time. However, the survey instrument used in this study did not address the discrete time spent in (teaching, scholarship or service) each domain.

There are potential factors such as decreased time availability that coincide with scholarly activity that could have had an impact on many faculty members. It appears that faculty in PT programs with high levels of scholarly activity may be able to either 1) budget their time more effectively despite the



constraints imposed by research that may impact some faculty by taking their focus away from teaching as mentioned in the literature<sup>80</sup> or 2) utilize time off from teaching responsibilities (faculty release time) supported by funds from a research grant. It also may be beneficial for future studies to explore how factors such as student enrollment increases have an impact of faculty time availability. When viewing education statistics of 2015, it was projected that student enrollment among degree seeking U.S. institutions would increase by 15 percent (approximately 19.9 million students) between 2004 and 2015.<sup>134</sup>

These findings are linked to the assumption of scholarly activity impacting student scores based on faculty traits purported by Vicens and Bourne who believe that effective teachers are able to budget their time between teaching and scholarship which prevents imbalances of quality between the two.<sup>79</sup> There are known advantages to scholarly activity such as continuing faculty education, maintaining currency between research and teaching as well as gaining public recognition and a good reputation for the institution. However, in lower ranked programs, this may be outweighed by the known disadvantage such as prioritizing faculty research and publications for the sole purpose of obtaining external funding for the institution.<sup>118-120</sup> Literature provides evidence of universities pushing for higher volumes of publications for such funding purposes.<sup>119-120</sup> In Australia alone, during 2013, faculty publications in books, journals and conference papers determined how 10% of the \$678 million funding for Ph.D. research was allocated.<sup>121</sup> This incentive has placed additional pressure on faculty to publish in large quantities rather than developing a useful research

agenda and effective teaching strategies. This author believes that this can potentially create a conflict of interest which can negatively impact faculty commitment to teaching and student outcomes.

This may also indicate that scholarly activity, when assessed separately from other faculty characteristics, cannot alone define faculty effectiveness. Rather, multiple faculty traits, when combined, may better define faculty that are effective in improving student outcomes.

Further research should address the nature of how NPTE scores are impacted by scholarly productivity combined with other characteristics such as years spent teaching, availability and use of program resources and time management in order to gain clarity on these relationships. Exploring how different types of scholarly activity impact the degree and quality of student outcomes would be beneficial. Also, additional research should explore possible predictor relationships that may exist between scholarly activity of all PT programs and the actual NPTE exam scores in place of high vs low ranks.

### **NPTE 3YUPR and PT program length**

There is no mandatory requirement for PT program length. The CAPTE guidelines for PT program development states that a PT program varies between 3 to 4 years in length.<sup>122</sup> Also, the 2010 APTA fact sheet shows that the average program length for PT programs has gradually increased from 106.4 total weeks (77.3 didactic/lab and 29.2 clinical) in 2001-2002 to 120.1 weeks (85.3

didactic/lab and 35.1 clinical) in 2009-2010.<sup>123</sup> This increase in program length may be because of the additional knowledge requirements based of the transition from a Master's degree to a doctoring profession.

The transition from a Master's degree to a Doctorate degree was made by 43% of PT programs in 2003 and increased to 83% by 2007.<sup>124</sup> PT programs like the University of Colorado made this transition by adding 1 year to their existing Master's degree program to allow for needed time to integrate new material into their didactic and clinical curriculum. Their clinical portion alone increased from 23 to 46 weeks.<sup>124</sup> This led to research question 3:

Question 3: What is the difference in total PT program length (in weeks) of the professional component (didactic and clinical) per AAR data when comparing programs with high vs. low passing rates on the NPTE?

AAR data for program length was obtained via the data collection form returned by CAPTE. Comparably, the PT programs in this study had lengths in the same range as programs in 2009-2010. Data were limited to 3YUPR instead of first time pass rates on the NPTE. Previous studies in nursing education showed higher student achievement with shorter program lengths (12 weeks in comparison to 15 and 24 weeks) but only tested one school.<sup>95</sup>

An athletic training study found that program length (number of semester hours) may have an impact on exam success but no specific hours were provided and no definitive data were found to support this notion.<sup>97</sup> A dentistry

education study found that longer internships of 10 versus 6 weeks improved clinical productivity but not exam success.<sup>99</sup> Martorello explored optimal lengths of clinical education of physical therapy programs using the perceptions of Clinical Coordinators of Clinical Education who agreed on 5-8 weeks for acute care settings and 9-12 weeks for pediatric and home health settings.<sup>98</sup> Although prior studies<sup>95, 97, 98,99</sup> found varied links between program length (didactic and clinical) and levels of student achievement, the results of this study via Independent T-tests found no significant difference between program lengths for PT programs with high vs. low NPTE 3YUPR averages. However, it is important to note that the lack of differing means between groups (high vs. low) does not necessarily mean that there is no overall difference between the two. I believe that length can have an impact on student success when viewed in the right context. Overall program length may be too general in nature. There may be essential courses within the programs that provide an important link to student outcomes. If these courses can be identified, the length in which they are taught may have more of a quantifiable impact in comparison to the total length of the program itself. It is also important to note, when examining programs lengths, the impact that PT Bridge programs may have on program length data. However, there were only 2 accredited PT Bridge programs at the time this study was conducted, one of which was excluded due to 3YUPR not meeting inclusion criteria. The second school was included in this study. However, the length of the program is consistent with average DPT program lengths of programs in this study and therefore did not serve as an outlier in the data.

## LIMITATIONS

The self-generated faculty survey tool was not exhaustive regarding faculty behaviors. It was limited mostly to faculty teaching traits because the majority of constructs attributed to service and scholarship were not discrete leading to elimination of these constructs during the survey development process. At the conclusion of the study, it is evident that the acts of service and scholarship are components of teaching and would be more beneficial had they been more adequately defined in the final survey.

Data were also limited by the nature of the self-reporting method used to identify faculty behaviors which relied on their accuracy, honesty, understanding and interpretation of the survey questions. Also, while the use of the online tool (surveyexpressions.com) allowed for a convenient method of distributing and collecting responses from a large sample, the researcher was unable to ensure that the intended subject actually answered the survey questions.

Because the majority of PT programs excelled on the NPTE, the classification of PT programs in high versus low categories consisted of a small range (100 for high and 95 or below for low) leaving a nominal difference between the two groups. This was necessary because only three PT programs scored below the 2013 recommended CAPTE 3YUPR average of 80%. When assessing other percentages only four programs scored below 85% while 80 PT programs scored 100% averages. Therefore, the cut off mark had to be raised to 95% (average range between 50% to 95%) to allow a more even comparison

group between high and low rated programs in terms of sample size. This may have impacted the ability to accurately differentiate between lower rated programs.

This study was unable to address first year pass rates because in order to maintain anonymity of programs, the FSBPT only provided 3YUPR. Also, to prevent the ability to identify individual programs based on 3YUPR, CAPTE only provided AAR data for programs if they were classified as either highly ranked or low ranked (based on 3YUPR cut off points used as inclusion criteria for this study). This prevented a more in depth exploration of the differences between low scoring (3YUPR) programs on the higher end (i.e. 90% average) to low scoring (3YUPR) programs on the lower end (i.e. 50% average).

Data analysis were also limited due to using the total sum of scholarly activity and program length for one given year (2013) and comparing that to a 3 year average of NPTE pass rates (2011-2013). The results may have been more representative of the population if scholarly activity, program length and NPTE pass rates for the same year were used.

The differences in Physical Therapy education program data and faculty responses may be a result of external influences/pressures from economic, political and societal factors. These factors play a role in program accountability resulting in program expansion, diversity of curriculum, financial stability which impacts research and faculty pay. These influences can place varying degrees of urgency for programs concerning academic research and service tasks that

impact public awareness and state funding.<sup>135-136</sup> There is also competitiveness between academic institutions for the best faculty, students, research grants, donations, achieving higher rankings (i.e. U.S. News and World Report) and to fulfill and respond to student needs by providing the best curriculum.<sup>135-136</sup>

## **DELIMITATIONS**

Because of the interest of finding PT educational program and faculty behaviors that could predict student NPTE success, a systematic literature review was focused mainly on factors that defined program quality and student outcomes in PT education and other disciplines. The aim was to find relevant research that offered current knowledge of the research topic.

A self-generated survey was the instrument of choice due to the lack of other pre-established tools with the ability to test the desired faculty behaviors of PT programs of interest in this study. The survey consisted only of constructs consistent with effective teaching based on the literature review for quality PT educational programs. Online email distribution of this tool was used instead of mail or in person groups due to the ease of use and the ability to collect responses from a larger sample.

PT educational program chairs/directors were the subjects of interest for survey completion because of their role in academic leadership providing them with a more in depth knowledge of the survey material. Survey data was

collected from faculty of the 2014-2015 school term to allow results/responses for the most current practices and/or trends.

Self-generated survey validation was completed and distributed by current faculty during the 2014-2015 PT school term but the results were limited to comparison with PT programs meeting the inclusion criteria for 2011-2013 school terms because that was the most recent FSBPT data available. Future surveys should control for this difference by asking the participants to specify their years of employment as a Director/Chair/Faculty member at their specific educational institution.

The electronic AAR database was the resource used for retrospective data collection because it consisted of program and faculty specific information for PT educational programs for a given year. The FSBPT database was a chosen resource due to it being the only database available for obtaining NPTE outcomes for all accredited PT educational programs. Without the need to manipulate variables, this allowed convenient access to data that already existed. This AAR and FSBPT data was requested for all accredited PT educational programs that met the inclusion criteria to increase the power of analysis and to allow the results to be generalized to the entire PT program population with regard to research question 2 and 3.



## CONCLUSIONS

Quality in Physical Therapy education programs is an important factor that is guided by CAPTE standards. During the time this study was conducted, the standard for 3YUPR rates was 80%. Although the majority of programs met this guideline, a few did not. Also, 3 year averages consist of student scores in a graduating class that passed the exam despite how many attempts it took, which gives little insight into what issues led to difficulties of passing the exam on the first try. PT programs are responsible for adequately preparing students to take and pass the NPTE. With NPTE scores being a program quality indicator, it was imperative to look deeper into understanding different aspects of academic preparation to ensure that all programs meet high NPTE averages and all students have adequate preparation to pass on the first attempt.

CAPTE has compiled a series of general guidelines for programs to 1) require faculty to be committed to effective teaching, student learning, service, 2) provide a environment conducive to learning, 3) have adequate resources (i.e. staff and learning resources), and to 4) have an ongoing assessment process to measure program effectiveness. Although important, these guidelines are vague and not specific or sufficiently detailed to be measurable for use as points of reference. Each program is left to its own discretion on how these guidelines will be achieved. Also there is no standardized faculty assessment tool for PT educational program use in highlighting areas of needed improvement.

As a result, assessing faculty traits and their impact on student achievement was an important focus of this study. A goal of this study was to develop a survey tool that could measure and distinguish faculty behaviors consistent with high rated NPTE scores. The results indicated that approximately 86% of all faculty behaviors that were surveyed were more frequently performed at PT programs that rated high on their 3YUPR scores. The generated survey helped to validate the possibility of accurately testing faculty for behaviors consistent with programs scoring high on the NPTE. The survey was reduced to behaviors that were mainly considered a teaching trait with the majority of service and scholarship traits removed during survey development. However, after analyzing all results from this study, it was evident through pilot study responses (challenges in maintaining separations between teaching, scholarship, and service) and prior literature<sup>131-132</sup> that both scholarship and service are important aspects of teaching and faculty scholarship can serve as a predictor of student success. With this understanding, the survey could be improved by including additional questions representative of faculty service and scholarship but placed under the general theme of teaching instead of making them separate domains which would encompass a broader range of behaviors representative of quality faculty. This survey, if further developed, could be a useful tool for PT programs to identify specific faculty or program variables that accurately predict a student's success on the NPTE in a given year. Once specific faculty behaviors are consistently linked with having a relationship with student outcomes, additional efforts, such as standardization of faculty professional development, can be

made to encourage quality teaching and learning as part of all PT educational programs.

This study also tested if a difference existed between high and low rated (NPTE 3YUPR) programs based on total scholarly activity performed and overall program length. Higher rated programs had a significantly higher sum of scholarly activity in comparison to lower rated programs (ranged from 1 to 67). Scholarly activity of faculty is recognized as an essential attribute for student learning and is believed by the researcher to have a positive impact of student outcomes. With increased scholarly activity demands, faculty at lower scoring programs possibly have to be more proficient in managing their time (within the normal schedule for teaching) in order to prevent compromise of other teaching responsibilities. Also, when adequate time is not available to allow both scholarly activities and routine teaching, there may be a lack in program resources such as additional support staff that may cover didactic needs to allow for faculty to fulfill scholarship obligations or financial limitations such as research grants that allow faculty time off to dedicate to scholarly activities. This may be a factor that lower scoring programs are impacted by. Scholarly activity in itself is believed by the researcher to serve as a positive factor if faculty are able to control for these extraneous factors.

There was no difference found between high and low rated programs (NPTE 3YUPR) for program lengths ranged from 92 to 180 total weeks. The literature either stated that length had an impact on student success without

quantifying or focused only on clinical components of various programs outside of physical therapy. Although this study did not find a difference between programs based on NPTE 3YUPR rate, further research should be performed to explore program length in a different context. The overall length of a PT program may be too broad and unspecific in nature. However, within each program, there are specific courses that may have a greater impact on student learning than others. For example, we might find that a course in pharmacology plays less of a role in passing the NPTE when compared to a course in Neuroanatomy or Kinesiology. It should not be a goal of any program to teach only to pass the NPTE. However, by recognizing which courses have a greater impact on student success on licensure exams, this might support that need to expand/lengthen individual courses to allow for greater gains of knowledge and understanding of an area in which the Federation of State Boards of Physical Therapy has recognized as being necessary for safe practice.

Based on the literature review of factors that impact student achievement, questions arose concerning who should be held accountable in fostering this achievement; which resources need to be in place; and how PT educational programs are measuring these efforts. From this study alone, there is evidence that faculty behaviors have a direct link with student scores and therefore faculty should be on the list of those who should be held accountable for some aspects of student learning. Resources that allow for faculty training workshops should be considered. Faculty survey tools such as the one used in this study should be used to measure the efforts to improve program quality. Increased knowledge of

these relationships will help to diversify the future development of PT programs and guide faculty requirements in efforts to create a universally accepted operational definition of program quality.

## **RECOMMENDATIONS FOR FURTHER RESEARCH**

Based on this study's' results. I recommend that when examining overall program length, future studies should explore which specific courses in the curriculum impact student NPTE outcomes the most. Then differences in course length should be assessed to determine if longer or shorter course lengths in subjects that are directly related to the NPTE promote student success. With limited research on physical therapy program length and its impact on student outcomes, it should not be assumed that no relationship exists. This study should serve as a baseline for future studies to explore further.

This study showed that a difference can be found when comparing faculty within one point in time. A longitudinal repeated measures design study on PT educational programs with high NPTE scores should be conducted using the self-generated survey over a period of time to see how changes in faculty behaviors within the same school may impact student first time pass rates and then repeated with low scoring programs. Additionally, to ensure that all possible faculty influences have been addressed, further research should address the nature of how NPTE scores are impacted by scholarly productivity and other characteristics such as years spent teaching, student engagement, time management (total hours spent on teaching, scholarship, service, methods of

assessing student outcomes), student-teacher research opportunities, faculty satisfaction and available institutional support/benefits that facilitate teaching needs) combined in order to gain clarity on the relationship.

It may also be beneficial to test the degree of teacher effectiveness when participating in scholarly activity that is not related to the subject in which they teach. Although scholarship is deemed important, it's important to determine if the concept of performing research, in general, provides teachers with the tools that can be used to enhance their impact on any subject they teach or, if scholarly activity is most beneficial when performed in their teaching subject. It is also recommended that Pearson product moment correlations be performed with faculty data that are linked specifically with NPTE first time pass rates from a specific year to allow exploration into predictive relationships for a time frame in which the NPTE scores were collected.

Although it is not typical for any faculty in the PT profession to have received teacher training prior to teaching, per survey results, many faculty within high scoring programs selected that they did receive such training. It may be beneficial to further explore the specifics of pre-teacher training to further understand its impact on teacher effectiveness. The survey can also be improved by incorporating an option for open ended explanation for survey response choices, instead of only requiring that subjects choose a yes or no option for each listed faculty behavior. This would allow them to expand upon their response choices that could provide supporting evidence and clarity for overall

survey data. For example, the survey statement “having adequate faculty availability” referenced office hours to accommodate student needs but could have been misinterpreted as meaning a well-staffed program. Reduction in biased responses based on survey wording could be accomplished via use of a Likert scale that allows expansion of quantity if subjects respond “yes” to participating in a survey behavior.

## APPENDICES

### APPENDIX 1

#### Round 1: Descriptors/constructs defining faculty scholarship, teacher effectiveness, and service

Topic	Definition	Constructs
Scholarship	Discovery research, integration, service and teaching <sup>95</sup>	<ol style="list-style-type: none"> <li>1. research agenda</li> <li>2. research mentor</li> <li>3. sharing research ideas</li> <li>4. research in teaching subject</li> <li>5. activities that promote professional development</li> <li>6. literature research</li> <li>7. reflection on the accuracy of teaching material</li> </ol>
Teaching Effectiveness	Leading to improved student outcomes <sup>40</sup>	<ol style="list-style-type: none"> <li>1. adequate preparation</li> <li>2. instructional strategies</li> <li>3. methods that promote student learning</li> <li>4. learning environment</li> <li>5. pre-requisite course knowledge</li> <li>6. knowledge of skills students are to learn</li> <li>7. student guidance methods</li> <li>8. presentation of subject matter</li> <li>9. interest in subject</li> <li>10. alternative teaching approach</li> </ol>



		11. high student expectation 12. improving expertise 13. teacher training 14. perception of common student difficulties 15. teacher availability 16. reflecting on teaching methods 17. relevant level of expertise 18. converting instruction principles into learning activities 19. teaching approach guided by practical knowledge 20. knowledge of your course in aggregate to other courses in curriculum
Service	A patient care/clinical focus in the community <sup>68</sup>	1. community based activities

## APPENDIX 2

### Survey development: First round survey

#### Faculty Characteristics In Physical Therapy Educational Programs

0%

**1. What is your current position at your academic institution?**

- ☐ Chair/Director  
☐ Professor  
☐ Assistant Professor  
☐ Associate Professor  
☐ Instructor  
☐ Other, please specify...

**2. Are you currently teaching a course within the physical therapy curriculum? If you answer no to this question, please disregard the questions below and submit the survey.**

- ☐ Yes  
☐ No

**3. Regarding the roles of DPT faculty (teaching, scholarship and service), for each statement listed below, sort and identify as belonging to the same group. For example, if the 1st, 3rd and 5th statements appear to represent the same role type, select the same grouping for all three. If a statement does not pertain to a role as a faculty member, select "N/A" for not applicable.**

	Teaching	Scholarship	Service	N/A
Applying course content with community-based activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attending workshops for teacher preparation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Awareness of effective instructional strategies that address student learning needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Combining learning goals with community service.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comparison and review of commonly used instructional formats in your	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## APPENDIX 2 (continued)

<b>classroom.</b>				
<b>Critique of methods that promote student application of taught material.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Engaging students in tasks to enhance learning outcomes as well as community needs.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Establishing a research agenda.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Exploration of instructional environments that maximize student learning.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Faculty/professors that are consistently approachable.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Familiarity with pre-requisite knowledge expected prior to the course you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Familiarity with the outline of skills students are expected to learn in your course.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Guidance of a research mentor.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Guidance of students through methods that promote knowledge recall.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Having a clear understanding of how to structure and present subject matter.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Having a true interest in the subject you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Having an alternative teaching approach if students are not learning.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Having high expectations for students.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## APPENDIX 2 (continued)

<b>Improvement of your expertise in the course subject you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Participating in opportunities to share research ideas and practice with fellow faculty.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Receiving teacher training prior to teaching.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Perception of common misconceptions/difficulties that students encounter.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Performing research in the subject area in which you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Providing students with adequate faculty availability.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Reflection and analysis of teaching methods.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Relevant level of professional expertise for the course you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Researching activities that promote professional development.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Researching the literature to reflect on the accuracy of the material you teach.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Reviewing various means that promote student understanding.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Studying how to convert principles of instruction into learning activities.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Teaching approach that is guided by practical knowledge (continuous application).</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Understanding how your course fits in aggregate to other courses in the curriculum.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## APPENDIX 3

### Second round survey instrument- Final faculty 22 item questionnaire

Based on your current role as an educator of physical therapy students, answer yes or no for each question listed below.

**\* 1. Are you currently teaching a course within the physical therapy curriculum?**  
If you answer no to this question, please disregard the questions below and submit the survey.

- ☐ Yes  
☐ No

**\* 2. What is your current position at your academic institution?**

- ☐ Chair/Director  
☐ Professor  
☐ Assistant Professor  
☐ Associate Professor  
☐ Instructor  
☐ Other

**\* 3. Regarding your current role as an educator of physical therapy students, please answer yes or no to each question listed below.**

	yes	no	NA
Do you guide students through methods that promote knowledge recall?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you compare and review commonly used instructional formats in your classroom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you critique methods that promote student application of taught material?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you study how to convert principles of instruction into learning activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you explore instructional environments that maximize student learning?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is your teaching approach guided by practical knowledge (continuous application)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	yes	no	NA
Do you have a clear understanding of how to structure and present subject matter?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you perceptive of common misconceptions/difficulties that students encounter?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you aware of effective instructional strategies that address student learning needs?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you familiar with the outline of skills students are expected to learn in your course?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you understand how your course fits in aggregate to other courses in the curriculum?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you familiar with the pre-requisite knowledge expected prior to the course you teach?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you participate in opportunities to share research ideas and practice with fellow faculty?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you perform research in the subject area in which you teach?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you receive teacher training prior to teaching?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you attended workshops for teacher preparation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you established a research agenda?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have a true interest in the subject you teach?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you provide students with adequate faculty availability?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have high expectations for your students?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have an alternative teaching approach if students are not learning?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you engage students in tasks to enhance community needs?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## **APPENDIX 4**

### **FSBPT Request Letter for Student 2013 NPTE Pass Rate**

Physical Therapy Department

Nova Southeastern University

3200 S. University Dr., Fort Lauderdale, FL 33328

Dear Sir/Madam,

This letter serves as a request for 2013 PT student pass rates from all CAPTE accredited PT educational programs to be used in an upcoming research study. These data will be used to determine if a relationship exists between PT program characteristics (program length and faculty scholarly activity) and student PT graduate first time pass rates on the NPTE. Upon reception of the requested data, I guarantee the provision of the research study results to the Federation of States Boards of Physical Therapy. I am the principal investigator, and I hereby assure CAPTE that the requested data will be used for the sole purpose described above and will not be used for any other extraneous endeavors. An approval letter containing the terms of my IRB approval has been attached.

Sincerely,

Natonya Early, MSPT

## APPENDIX 5

### Federal State Board of Physical Therapy data collection form

FSBPT Data Collection Form					
School Name	ID#	Total Graduates	Total Grads NPTE Tested	Average 1st Time Pass Rates	3 Year Pass Rate
<b>Code Key:</b>					
School Name			Full name of accredited PT educational program		
ID#			De-identifier code assigned to each school		
Total Graduates			Total # of 2013 PT program graduates		
Total Grads NPTE Tested			Total # of 2013 graduates that took the NPTE		
Average 1st Time Pass Rates			Average first time graduate pass rate		
3 Year Pass Rates			Ultimate prior 3 year pass rate		



## **APPENDIX 6**

### **FSBPT instructions for data collection form**

Please read the following instructions carefully to accurately complete the data collection form. Note- All data is being requested for the 2013 academic school year.

For column one (School Name), the full name of each PT educational program has been provided by the researcher. In column two (ID #), numerical code for each PT program has been provided by the researcher. In column three (Total Graduates, provide the total number of graduates from each program. In column four (Total Grads NPTE Tested), provide the total number of graduates whom took the NPTE. In column five (Average 1<sup>st</sup> Time Pass Rates), provide first time pass rates for each school. In column six (3 Year Pass Rate), provide the school's ultimate prior 3 year pass rate for the NPTE.

## **APPENDIX 7**

### **CAPTE request letter for AAR data**

Physical Therapy Department

Nova Southeastern University

3200 S. University Dr., Fort Lauderdale, FL 33328

Dear Sir/ Madam,

This letter serves as a request for 2013 AAR data to be used in an upcoming research study. These data include faculty scholarly activity (cumulative number of published or accepted articles, books or book chapters, and presentations of all core faculty of a given PT program); program length (total number of combined weeks that students participate in classroom and clinical education); and total faculty (total number of full time, part time faculty positions filled by a physical therapist and core positions not filled by physical therapists). The requested data will be used for the purpose of determining if a relationship exists between PT program characteristics (program length and faculty scholarly activity) and student PT graduate first time pass rates on the NPTE. I agree to provide the research study results to the department of accreditation. Results of this study will be also be disseminated in the final research summary. I am the principal investigator, and I hereby assure CAPTE that the requested data will be used for the sole purpose described above and

**APPENDIX 7 (continued)**

will not be used for any other extraneous endeavors. An approval letter containing the terms of my IRB approval has been attached. The intent is to analyze the requested within 30 days from your receipt of this request.

## APPENDIX 8

## CAPTE Annual Accreditation Report data collection form

[illegible]

## **APPENDIX 9**

### **CAPTE instructions for data collection form**

Note-All data are being requested from AAR records for the 2013 academic school year. The following lists instructions for the enclosed Excel data collection form.

1. NPTE pass rate data for selected Physical Therapy programs were obtained from the FSBPT website and have been assigned one of two letter rates based on their average three year pass rates. These programs and their assigned rates have been provided on the “Data Completion Supplement Form” included in this package. To ensure the anonymity of PT school data, select PT programs from the provided list (in the order of your choice) and transfer the following on the data collection form under the designated columns for each school:
  - A. PT school name (column 1)
  - B. Assigned School Rate (column 2)

Note- For ease of spreadsheet completion and to ensure all data are being entered for the correct corresponding school, the first column titled “PT School” is optional but must be removed before spreadsheet can be returned to researcher. Once these data have been entered, CAPTE 2013 data for each corresponding school should be entered into spreadsheet in the following steps.

2. In the faculty scholarly activity columns, list:

- A. Total number of peer-reviewed articles published
- B. Total number of books or book chapters published

APPENDIX 9 (continued)

- C. Total number of other articles published including abstracts

3. In the PT program length columns, list:

- A. Total length in weeks of classroom courses
- B. Total length in weeks of clinical education courses
- C. Total length in weeks of the final clinical education experience

4. In the total faculty column, list:

- A. Total number of full time core faculty positions that are filled by a PT
- B. Total number of part time faculty positions that are filled by a PT
- C. Total core positions that are not filled by a PT

5. Once all data are entered, cut off and discard the PT school column along the perforated line to remove names or/and identifiable information. Note- Do not remove the Assigned Program Rate column. Return the completed spreadsheet via the enclosed stamped envelope to:

Natonya Early

239 Nautilus Drive, Unit 209

New London, CT 06320

## APPENDIX 10

### Round 1 Survey: Low classification items

Statement	Intended category	Actual category	Action
Faculty/professors that are consistently approachable	Control question. Not intended for a specific category	Responses divided between all 4 categories (teaching, scholarship, service, NA)	Left in data set to continue serving as a control variable
Improvement of your expertise in the course subject you teach	Scholarship	Responses divided between 3 categories (teaching, scholarship, service)	Removed from data set
Relevant level of professional expertise for the course you teach	Scholarship	Responses divided between all 4 categories (teaching, scholarship, service, NA)	Removed from data set
Reviewing various means that promote student understanding	Teaching	Responses divided between 3 categories (teaching, scholarship, service)	Removed from data set
Engaging students in tasks to enhance learning outcomes as well as community needs	Service	Responses divided evenly between 2 categories (teaching and service)	Wording changed (Engaging students in tasks to enhance community needs)

## REFERENCES

1. Bennet D. Assessing quality in higher education. *Liberal Educ.* 2001; 87 (2)
2. Federation of State Boards of Physical Therapy. Examination results and scoring. Available at:  
<https://www.fsbpt.org/ForCandidatesAndLicensees/NPTE/FAQs/index.asp#results>. Accessed December 2, 2010.
3. Commission on Accreditation in Physical Therapy Education. Evaluative criteria for accreditation of education programs for the preparation of physical therapists. Alexandria: American Physical Therapy Association; 1998.
4. Maring J, Costello E. Education program and student characteristics associated with pass rates on the NPTE for physical therapist assistants. *J Phys Ther Educ.* 2009; 23(1).
5. Koshmal E. Factors related to physical therapist license examination scores. *J Phys Ther Educ.* 2005; 19(52)
6. Tippet S. Program impact of student outcome assessment in physical therapy education. *J Phys Ther Educ.* 2006; 20(2).
7. Thieman T, Weddle M, Moore M. Predicting academic, clinical, and licensure examination performance in a professional (entry-level) master's degree program in physical therapy. *J Phys Ther Educ.* 2003; 17 (32).
8. Mohr T, Ingram D, Haynes S, Du Z. Educational program characteristics and pass rates on the NPTE. *J Phys Ther Educ.* 2005; 19(1).



9. Martorello L. The optimal length of clinical internship experience for entry-level physical therapy students as perceived by Center Coordinators for Clinical Education: a pilot study. *J Phys Ther Educ*. 2006; 20(1).
10. Dolton P, Newson D. The relationship between teacher turnover and school performance. *London Rev of Educ*. 2003; 1(2): 132 –140.
11. Kosht-Novak, M. The relationship between physical therapist assistant faculty characteristics and program outcomes on the national physical therapy examination [dissertation]. Fort Lauderdale, FL: Nova Southeastern University, 2009.
12. A Normative Model of Physical Therapist Professional Education: Vision 2020. Alexandria, VA: American Physical Therapy Association. 2000: 98-101.
13. Lekkas P, Larsen T, Kumar S, et al. No model of clinical education for physiotherapy students is superior to another: a systemic review. *Aust J Physiother*. 2007; 53.
14. Gandy S. Fiscal implications for clinical education. In: issue in clinical education present status/future needs. Alexandria, VA: American Physical Therapy Association; 1998:67.
15. Gerace L, Sibilano H. Preparing students for peer collaboration: a clinical teaching model. *J Nurs Educ*, 1984; 23: 206-209.
16. Radtka S. Predictors of physical therapy faculty job turnover. *Phys Ther*. 1993; 73 (4):8.

17. Rothstein M. Scholarship: It's not an option, it's a necessity. *Phys Ther.* 2004; 84: 494-495.
18. Andrew W, Johansson C, Chinworth SA, Akroyd D. Cognitive, collegiate, and demographic predictors of attrition in professional physical therapist education. *J Phys Ther Educ.* 2006; 20:1.
19. Chan D. Association between student learning outcomes from their clinical placement and their perceptions of the social climate of the clinical learning environment. *Int J Nurs Stud.* 2002; 39, 517-524.
20. Commission on Accreditation in Physical Therapy Education. CAPTE Rules of Practice and Procedure. Alexandria, VA; American Physical Therapy Association; 2013.
21. Southern Association of Colleges and Schools. Accreditation standards for quality schools 2007. Available at: [www.advance-ed.org/new/standards-quality](http://www.advance-ed.org/new/standards-quality). Accessed December 10, 2010.
22. Venduey A. Student assessment methods in physical therapy education. *J Phys Ther Educ.* 2002; 16 (2).
23. Federation of State Boards of Physical Therapy. Purpose of the exam. Available at: <https://www.fsbpt.org/ForCandidatesAndLicensees/NPTE/>. Accessed February 2, 2011.
24. Ecclestone K. Empowering or ensnaring?: the implications of outcome-based assessment in higher education. *High Educ Q.* 1999;53 (1).

25. Commission on Accreditation in Physical Therapy Education. CAPTE accreditation handbook. Alexandria, VA; American Physical Therapy Association; 2004.
26. Baldwin G, Blackburn T. College faculty: versatile human resources in a period of constraint. *New Directions for Institutional Research*, San Francisco, CA: Jossey-Bass Inc, 1983; 40.
27. Brueilly K, Williamson E, Morris S. Defining core faculty for physical therapy education. *J Phys Ther Educ*. 2007; 21 (2).
28. Rothstein M. Research productivity: time to lead. *Phys Ther*, 2000; 80: 746-747.
29. Kaufman R. A reflection on disciplinary nature and the status of physical therapy scholarship. *J Phys Ther Educ*. 2005; 19 (1).
30. Peterson C, Umphred D. A structured faculty development process for scholarship in young faculty: a case report. *J Phys Ther Educ*. 2005; 19 (3).
31. Hagstrom F. Formative learning and assessment. *Communication Disorders Quarterly*. 2006; 28(1): 24-36.
32. Darling-Hammond L. Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1).
33. Rothstein M. "Clinical education" versus clinical education. *Phys Ther*, 2002; 2.

34. Laine S, Behrstock-Shenatt E, Lasagna M. Improving teacher quality: a guide for education leaders. 1<sup>st</sup> ed. San Francisco, Ca: Jossey-Bass publications; 2011.
35. Gwyer J, Odom C, Gandy J. History of clinical education in physical therapy in the United States. *J Phys Ther Educ*. 2003; 17(3).
36. Rushton A. Formative assessment: a key to deep learning? *Med Teach*. 2005; 27 (6): 509-13.
37. Dunfee H. Clinical education: past, present, and future. *J Phys Ther Educ*. 2008;22 (3).
38. Whitney L. The history of physical therapy education in the United States. *J Phys Ther Educ*. 2003; 17 (3).
39. Moffat M. The history of physical therapy practice in the United States. *J Phys Ther Educ*. 2003; 17.3: 15-25.
40. Moffat M. Three quarters of a century of healing the generations. *Phys Ther*. 1996; 76,1242-1252.
41. Borden Institute. Physical therapy in a wartime environment: Rehabilitation of the injured combatant. Available at:  
[https://ke.army.mil/bordeninstitute/published\\_volumes/rehab1/RH1ch2.pdf](https://ke.army.mil/bordeninstitute/published_volumes/rehab1/RH1ch2.pdf)  
Accessed May 1, 2015.
42. Council of Higher Education. An overview of United States accreditation council for higher education. Available at:

- [www.chea.org/pdf/overview\\_US\\_accred\\_8-03.pdf](http://www.chea.org/pdf/overview_US_accred_8-03.pdf). Accessed November 3, 2010.
43. Nieland M, Harris J. History of accreditation in physical therapy education. *J Phys Ther Educ*. 2003; 17 (3):52.
44. Plack M, Wong K. The evolution of the doctorate of physical therapy: moving beyond the controversy. *J Phys Ther Educ*. 2002; 16 (1): 48.
45. Commission on Accreditation in Physical Therapy Education. CAPTE accreditation update. Alexandria, VA; American Physical Therapy Association; 2005.
46. Bella M. Are We There Yet? *J Phys Ther Educ*. 2009;23 (2).
47. U.S. Department of Health & Human Services. Effects of health care spending on the U.S. economy: Executive summary; 2005. Available at: <http://aspe.hhs.gov/health/costgrowth>. Accessed December 5, 2011.
48. Ward S. Statement by APTA president on economic challenges. 2008. Alexandria, VA: American Physical Therapy Association. Available at: [www.apta.org](http://www.apta.org). Accessed December 1, 2012.
49. Ward S. Official statement: Challenges facing physical therapists in the skilled nursing facility setting. Alexandria, VA: American Physical Therapy Association. [www.apta.org](http://www.apta.org). Accessed January 1, 2012.
50. The Federation of State Boards of Physical Therapy. Standards of competence. Alexandria, VA. 2006. Available at: [www.fsbpt.org](http://www.fsbpt.org). Accessed December 5, 2011.

51. Hillegass E. Linda Crane Lecture 2008: The challenge for the future five steps to improve quality, incorporate prevention, maintain productivity, and have fun! *Cardio Phys Ther J*. 2008; 19(2).
52. Verma S, Paterson M, Medves J. Core competencies for health care professionals: What medicine, nursing, occupational therapy and physiotherapy share. *J Allied Health*. 2006; 35 (2).
53. Academic Council of the American Physical Therapy Association. Available at: <http://acapta.online.org/about.cfm>. Accessed December 1, 2012.
54. Kay P. A second look at accreditation: student, faculty and employer perceptions of academic quality [dissertation]. Brockport, NY: Doctor of education in adult education, Syracuse University; 1984.
55. Clewell B. Assessing educational quality in higher education [dissertation]. Tallahassee, FL: Doctor of philosophy, Florida State University; 1980.
56. Fansler G. Determining quality in doctoral programming: A grounded theory study of biological sciences [dissertation]. Chicago, IL: Doctor of philosophy, Illinois State University; 2000.
57. Overdorf J. Dimensions of academic program quality: A study of coordinated programs in dietetics education [dissertation]. Buffalo, NY: Doctor of philosophy, University of New York; 1999.

58. Commission on Accreditation in Physical Therapy Education. Guide to the development of education programs for physical therapists or physical therapist assistants: initial considerations and feasibility. Available at: [http://www.apta.org/AM/Template.cfm?Section=Developing\\_Programs2&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=78254](http://www.apta.org/AM/Template.cfm?Section=Developing_Programs2&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=78254) . Accessed October 9, 2010.
59. Higher Education Research Institute home of Cooperative Institutional Research Program. HERI faculty survey. Available at: [www.heri.ucla.edu/facoverview.php](http://www.heri.ucla.edu/facoverview.php). Accessed December 1, 2014.
60. Tucker P, Stronge J. Linking teacher evaluation and student learning. Alexandria, VA. Association for supervision of curriculum development; 2005. <http://www.ascd.org/publications/books/104136.aspx>. Accessed January 1, 2015.
61. Higher Education Research Institute. Undergraduate teaching faculty: The 2013-2014 HERI faculty survey 2014. Available at: <http://www.heri.ucla.edu/monographs/HERI-FAC2014-Monograph.pdf>. Accessed May 1, 2014.
62. Sanders W, Rivers J. Cumulative and residual effects of teachers on future academic achievement 1996. University of Tennessee value-added research and assessment center. Available at: [http://www.cgp.upenn.edu/pdf/Sanders\\_Rivers-TVASS\\_teacher%20effects.pdf](http://www.cgp.upenn.edu/pdf/Sanders_Rivers-TVASS_teacher%20effects.pdf). Accessed December 1, 2015.

63. Darling-Hammond, L. How teacher education matters. *J Teach Educ.* 2000 51(3), 166-173.
64. Perkes V. Junior high school science teacher preparation, teaching behavior, and student achievement. *J Res Sci Teach.* 1967;5(2):121-126
65. Rosenholtz S. Teacher's workplace: The organizational context of schooling (education and psychology of the gifted series). Teachers College Press 1991-2003.
66. The National Council for Accreditation of Teacher Education. The standards of excellence in teacher preparation. Available at:  
<http://ncate.org/Public/ResearchReports/TeacherPreparationResearch/EffectivenessofTeacherPreparation/Conclusion1/tabid/363/Default.aspx>.  
Accessed 1-1-2014
67. Bureau of Labor statistics. Post-secondary teachers. Available at:  
<http://www.bls.gov/ooh/education-training-and-library/postsecondary-teachers.htm>. Accessed November 15, 2012
68. Commission on Colleges, Southern Association of Colleges and Schools. Faculty credential-guidelines. Decatur, Georgia. Dec 2006. Available at:  
<http://www.sacscoc.org/pdf/081705/faculty%20credentials.pdf>. Accessed November 10, 2015.
69. The National Center of Education Statistics. Teacher preparation and profession development; 2000. Available at: <https://nces.ed.gov>. Accessed May 18, 2016



70. Velde B, Wittman P, Carawan L, Knight S, Pokorny M. A dialogal investigation of "Who am I as a teacher?" *J Allied Health*. 2010; 39(1)
71. Berk R. Survey of 12 strategies to measure teaching effectiveness. *Int J Teach Learn High Educ*, 2005; 17(1), 48-62. Available at: <http://www.isetl.org/ijtlhe/> ISSN 1812-9129. Accessed November 2, 2011.
72. Delaney J, Johnson A, Johnson T, Treslan D. Students' perceptions of effective teaching in higher education. St. John's, NL: *Dist Educ LearnTech*. 2010. Available at: [http://www.uwex.edu/disted/conference/Resource\\_library/handouts/28251\\_10H.pdf](http://www.uwex.edu/disted/conference/Resource_library/handouts/28251_10H.pdf). Accessed January 1, 2012.
73. Salsali M. Evaluating teaching effectiveness in nursing education: An Iranian perspective. *BMC Med Educ*. 2005; 5 (29).
74. Tcholakova M, Georgieva D, Ivanor S. Linking teaching and research in the field of public health: the Bulgarian experience. *Rev Soc Bras Fonoaudiol*. 2012; 17(3); 340-5.
75. University of Central Lancashire. Impact: Linking teaching and research. School of public health and clinical sciences; 2009. Available at: [https://www.uclan.ac.uk/research/explore/groups/assets/impact\\_pedagogic\\_uclan.pdf](https://www.uclan.ac.uk/research/explore/groups/assets/impact_pedagogic_uclan.pdf). Accessed March 15, 2014.
76. University of Bristol. Combining research and teaching. The higher education academy. 2007. Available at: [http://economicsnetwork.ac.uk/showcase/kaplan\\_research](http://economicsnetwork.ac.uk/showcase/kaplan_research). Accessed January 1, 2012.

77. University of Bristol. Research and Teaching: a personal perspective; 2006. Available at:  
<http://www.economicsnetwork.ac.uk/showcase/brewerresearch.htm>  
Accessed December 15, 2011.
78. University of Dundee. Should research infect teaching in economics? 2006. Available at:  
[http://www.economicsnetwork.ac.uk/showcase/chatterji\\_research..](http://www.economicsnetwork.ac.uk/showcase/chatterji_research..)  
Accessed December 15, 2011.
79. Vicens Q, Bourne P. Ten simple rules to combine teaching and research. *PLoS Comput Biol*; 2009 (5). Available at:  
<http://www.ploscompbiol.org/article/info%3Adoi%2F10.1371%2Fjournal.pcbi.1000358>. Accessed January 15, 2012.
80. Visser-Wijnneen G, VanDriel J, VanderRijst R, Verloop N, Visser A. The ideal research teaching nexus in the eyes of academics: building profiles. *High Educ Res Dev*. 2010; 29(2), 195-210.
81. Ross E, Anderson E. The evolution of a physical therapy research curriculum: Integrating evidence-based practice and clinical decision making. *J Phys Ther Educ*. 2004; 18 (3): 52- 57.
82. Haslett S. Unpicking the links between research and teaching in higher education. *Newport CELT J*. 2009; 2:1-4.
83. Healey M. Developing the scholarship of teaching in higher education: A discipline-based approach. *High Educ Res Dev*. 2000; 19(2).

84. Boyer E. Scholarship reconsidered: priorities of the professoriate. Princeton, NJ; 1990. The Carnegie Foundation for the Advancement of Teaching. Available at:  
<http://www.umces.edu/sites/default/files/al/pdfs/BoyerScholarshipReconsidered.pdf>. Accessed December 1, 2014.
85. Boyer E. Scholarship revisited. Princeton, NJ; 1990. Carnegie Foundation for the Advancement of Teaching. Available at:
86. Moses I. Teaching, research and scholarship in the different disciplines. *High Edu*., 1990, 19(3), 341-375.
87. American Physical Therapy Association. Vision 2020. Alexandria, VA; Available at: <http://www.apta.org/vision2020>. Accessed March 9, 2011.
88. Smesny A, Williams J, Brazeau G, Weber R, Mathews H, Das S. Barriers to scholarship in dentistry, medicine, nursing, and pharmacy practice faculty. *Amer J of Pharm Educ*. 2007; 71(5): 91.
89. Commission on Accreditation in Physical Therapy Education. CAPTE accreditation handbook. Alexandria, VA; American Physical Therapy Association; 2015. Available at:  
[http://www.capteonline.org/uploadedFiles/CAPTEorg/About\\_CAPTE/Resources/Accreditation\\_Handbook/PositionPapers.pdf](http://www.capteonline.org/uploadedFiles/CAPTEorg/About_CAPTE/Resources/Accreditation_Handbook/PositionPapers.pdf). Accessed on June 19, 2016.

90. Palmer, P. Quality improvement in physical therapy education: What contributes to high first-time pass rates on the National Physical Therapy Examination? [dissertation]. Denton, TX: Doctor of philosophy, University of North Texas; 2001.
91. Parry D. The relationships of specific program characteristics of Ohio associate degree nursing programs to graduate pass rate on the National Council Licensure Examination [dissertation]. Athens, OH: Doctor of philosophy, Ohio University; 1991.
92. Nolan H, Wenzel J, Han H, Allen J, Paez K, Mock V. Advancing a program of research within a nursing faculty role. *J Prof Nurs*. 2008; 24 (6): 364-370.
93. American Physical Therapy Association Department of Accreditation. Physical therapist program 2010 fact sheet. Alexandria, VA; American Physical Therapy Association. Available at: <http://www.apta.org/AM/Template.cfm?Section=CAPTE3&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=51040>. Accessed April 1, 2011.
94. Commission on Accreditation in Physical Therapy Education. Accreditation handbook. Alexandria, VA: American Physical Therapy Association; 2010:115.
95. Yates L. The relationship of aptitude, course grades, and program length, to performance on a standards based test (NCLEX-RN) [dissertation]. Miami, Florida: Doctor of education in higher education; Florida International University. *Nurs Allied Health Source*; 2007.

96. Kerfoot B, Dewolf W, Masser B, Church P, Federman D. Spaced education improves the retention of clinical knowledge by medical students: a randomized controlled trial. *Med Educ*, 2007; 41:23-31.
97. Harrelson G, Gallaspy J, Knight H, Leaver-Dunn D. Predictors of success on the certification examination. *J Athl Training*. 1997; 32 (4).
98. Martorello L. The optimal length of clinical internship experiences for entry-level PT students as perceived by center coordinators of clinical education: A pilot study. *J Phys Ther Educ*. 2006; 20(1).
99. Mascarenhas A, Freilich S, Henshaw M, Jones J, Mann M, Frankl S. Evaluating externship programs: impact of program length on clinical productivity. *J Dent Educ*. 2007; 71 (4).
100. Greinn A, Krebel E. Health professions education. A bridge to quality. Washington, DC. The National Academies Press; 2003. Available at: <http://www.nap.edu/search/?term=Health+professions+education.+A+bridge+to+quality>. Accessed November 9, 2014.
101. Hickey M, Forbes M, Greenfield S. Integrating the institute of medicine competencies in a baccalaureate curricular revision: Process and strategies. *J Prof Nurs* 2010; 26:214–222.
102. Shalala D, Bolton L. The future of nursing: Leading change, advancing health report recommendation. Institute of Medicine of the National Academics. 2010. Available at: [www.ion.edu/reports2010/the-future-of-nursing-leading-change-advancing-health](http://www.ion.edu/reports2010/the-future-of-nursing-leading-change-advancing-health). Accessed November 10, 2014.

103. American Association of College of Nursing. Essentials of baccalaureate education for professional nursing practice; 2008. Available at: [www.aacn.nche.edu/education-resources/baccessentials08.pdf](http://www.aacn.nche.edu/education-resources/baccessentials08.pdf). Accessed November 9, 2014.
104. Berry D, Miller M, Berry L. Effects of clinical field-experience setting on Athletic Training students' perceived percentage of time spent on active learning. *J Athl Training*. 2004; 39(2):176–184.
105. Miller M, Berry D. An assessment of athletic training students' clinical placement hours. *J Athl Training*. 2002; 37(4):S229–S235.
106. Commission on Accreditation in Physical Therapy. The 2011 Annual Accreditation Report. Alexandria, VA; American Physical Therapy Association. Available at: [http://www.capteonline.org/uploadedFiles/CAPTEorg/AboutCAPTE/Resources/Annual-Accreditation\\_Report/CoverMemo.pdf](http://www.capteonline.org/uploadedFiles/CAPTEorg/AboutCAPTE/Resources/Annual-Accreditation_Report/CoverMemo.pdf). Accessed November 2, 2010
107. Federation of State Boards of Physical Therapy. Keeping the national licensure examinations current. Available at: <https://www.fsbpt.org/ForCandidatesAndLicensees/NPTE/passrates/index>. Accessed February 2, 2011.
108. American Physical Therapy Association Department of Accreditation. Physical therapist program 2011 fact sheet. Alexandria, VA; American Physical Therapy Association. Available at:

<http://www.apta.org/AM/Template.cfm?Section=CAPTE3&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=51040>. Accessed April 1, 2011.

109. Federation of State Boards of Physical Therapy. 2010 Delegate assembly report on the national physical therapy examination program. October 2010. Alexandria, VA 22314. Available at:  
[https://www.fsbpt.org/download/2010DH\\_ExamDevelopmentCommitteeReport.pdf](https://www.fsbpt.org/download/2010DH_ExamDevelopmentCommitteeReport.pdf) Accessed 8-4-2011.
110. Connelly, L. M. (2008). Pilot studies. *Medsurg Nurs*, 17(6), 411-2.
111. Hertzog, M.A. (2008). Considerations in determining sample size for pilot studies. *Res Nurs Health*, 31,180-191.
112. Hill, R. (1998). What sample size is “enough” in internet survey research? *Interpers Comput Technol: An Electronic Journal for the 21st Century*, 6(3-4).
113. Isaac, S., & Michael, W. B. (1995). Handbook in research and evaluation. San Diego, CA: *Educ Indus Test Serv*.
114. Thomas D, Watson W. Q-Sorting and MIS research: A primer. *Commun Assoc Inform Syst*. 2002(8).
115. Zait, A, Bertea P. Methods for testing discriminant validity. *Manage Market*. 2011; 9:2
116. Tavakol M, Dennick R. Making sense of Cronbach’s alpha. *Int J Med Educ*.2011; 2:53-55.
117. Ghasemi A, Zahediasl S. Normality tests for statistical analysis: A guide for non-statisticians.. *Int J Endocrinol Metab*. 2012; 10(2):486-9.

118. Portney L, Watkins M. Foundations of clinical research. Applications to practice. 2nd ed. Upper Saddle River, NJ: Prentice Hall; 2000.
119. Onwuegbuzie A, Daniel L. Uses and misuses of the correlation coefficient. Mid-South Educational Research Association; 1999. Available at: <http://eric.ed.gov/?id=ED437399>. Accessed November 20, 2014
120. State University. Faculty as entrepreneurs- Growth of faculty entrepreneurship, what is faculty entrepreneurship?, Advantages of faculty entrepreneurship, disadvantages of faculty entrepreneurship. 2016. Available at: <http://education.stateuniversity.com/pages/1966/Faculty-Entrepreneurs.html>. Accessed September 19, 2016.
121. Rawat S, Meena S. Publish or perish: Where are we heading? *J Res Med Sci*.2014;19(2):87-89. Accessed September 2, 2016
122. Abbott A, Cyranoski D, Jones N, Majer B, Schiermeier Q, Van Noorden R. Metrics: Do metrics matter? *Nature*. 2010;465:860-2. Accessed September 2, 2016
123. Knott M. Academic publications to become less important when funding university research. Federal Politics. 2015. Available at: <http://www.smh.com.au/federal-politics/political-news/academic-publications-to-become-less-important-when-funding-university-research-20151112-gkxkgl.html> Accessed September 2, 2016



124. Rapport M, Stelzner D, Rodriguez J. The doctor of Physical Therapy degree: A new curriculum for a new degree. *Phys Disabil: Educ Related Service*. 2007;26(1):63-76. Accessed September 2, 2016
125. Burton L, Mazerolle S. Survey instrument validity part II: Validation of a survey instrument examining athletic trainers' knowledge and practice beliefs regarding exertional heat stroke. *Athl Training Educ J*. 2011;6. Accessed Feb 20, 2017
126. Marbach-Ad G, Rietschel C, Thompson K. Validation and application of the survey of teaching beliefs and practices for undergraduates (STEP-U): Identifying factors associated with valuing important workplace skills among biology students. 2016. Available at: <http://www.lifescied.org/content/15/4/ar59.full>. Accessed Feb 20, 2017.
127. Dalal D, Lin B, Smith E, Zickar M. Psychometric properties and validation of the leadership circle profile. The Leadership Circle. 2008. Available at: <http://leadershipcircle.com/wp-content/uploads/2012/01/instrumentvalidationstudy>. Accessed Feb 19, 2017.
128. Krebs C, Lindquist C, Berzofsky M, Shook-Sa B, Peterson K, Planty M, Stroop J. Campus climate survey validation. Available at: <http://www.bjs.gov/content/pub/pdf/ccsvsftr.pdf>. Accessed Feb 23, 2017.
129. Ward K. Faculty service roles and the scholarship of engagement. Hoboken, N.J. ERIC Clearinghouse on Higher Education/Jossey-Bass. 2003;29(5)

130. Schnanbelt T, Statham A. Faculty perceptions of service as a mode of scholarship. 2007:14. Available at <http://hdl.handle.net/2027/8po.3239521.0014.102>. Accessed Feb 19, 2017.
131. Joyce B, Showers B. Student achievement through staff development: Fundamentals of school renewal. 2<sup>nd</sup> edition. New York: Longman.1995
132. Ducharme E, Ducharme M, Dunkin M. Teacher education-Historical overview, international perspective. Available at: [education.stateuniversity.com/pages/2479/Teacher-Education.html](http://education.stateuniversity.com/pages/2479/Teacher-Education.html). Accessed Feb 16, 2017.
133. Houstom R, Saha L, Dworkin A. Teachers in history. International handbook of research on teachers and teaching. Springer Science and Business Media. 2005. Available at: <http://www.springer.com/978-0-387-73316-6>. Accessed Feb 20, 2017.
134. Hussar W, Bailey T. Projections of education statistic in 2015 (NCES 2006-084). Washington, DC: National Center for Education Statistics, Institute of Education Statistics, U.S. Department of Education.
135. Higher education in context-Economic factors, an era of competition, demographic realities, governmental political and legal challenges, religious factors. 2017. Available at: [education.stateuniversity.com/pages/2041/Higher-Education-in-Context.html](http://education.stateuniversity.com/pages/2041/Higher-Education-in-Context.html). Accessed on February 20, 2017.
136. Echternach J. The political and social issues that have shaped Physical Therapy education over the decades. *J Phy Ther Edu*. 2003;17 (3)

